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Checklist of the family Sphingidae Latreille, 1802 (Lepidoptera: Bombycoidea) from Shirui Hills, Manipur, India

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Abstract

The present communication consists of the first-ever checklist of Sphingidae Latreille, 1802 comprising thirty-six species under nineteen genera of three subfamilies with twenty-nine new records to Manipur. Of which, two species viz. *Sphinx oberthueri* (Rothschild and Jordan, 1903) and *Theretra tibetiana* Vaglia and Haxaire, 2010 are new records to India. Field sampling was carried out at Shirui Hills, Ukhrul district, Manipur for four years (2016 to 2019) during March-April (Premonsoon), June-July (Monsoon), and September-October (Post-monsoon). The light-trapping method was employed at five localities of different elevations at Shirui Hills.

Keywords: Light-trapping, Manipur, New Record, *Sphinx oberthueri, Theretra tibetiana*

Introduction

The north-east Indian state Manipur lies in between 23°83'-25°68' N and 93°03'-94°78' E bounded by Nagaland on the north, Assam on the west, on the south, and along the east with Myanmar sharing about 352 km long international border. It covers a total geographical area of 22,327 km^2 of which 17,418 km^2 (78.01%) is under forest cover. Geographically, Manipur is divided into mountain ranges running north to south and a central plain-the valley of Imphal. The altitude of hills ranges from 833m to 3017m. The Manipur is part of the eastern Himalayan Biodiversity Hotspot and considered to be rich in floral and faunal diversity. The region is often known as a hot spot of biodiversity of economically important insects. An attempt was made to know the species diversity of Sphingidae inhabiting the Temperate forest of Shirui hills, Ukhrul district Manipur.

Sphingidae are medium to large-sized, heavy-bodied moths with long, narrow, pointed triangular forewing and a short, smaller hind wing which makes them agile fliers. The large eye, powerful thorax, and sharply pointed abdomen, the graceful, high-bred appearance of the whole creature, can hardly be mistaken (Bell and Scott, 1937). The antenna is filiform or setiform in many species but is more or less strongly clubbed in others. There are usually spines on the tibiae. Adults are generally active at night, although some are diurnal or crepuscular in habit. Proboscis usually very long, which is relatively longer than the body in Sphinginae Latreille (1802), and short or vestigial in Smerithinae Grote and Robinson, 1865. They are strong fliers, and many species are important pollinators of night-blooming flowers.

Sphingidae are a very diverse group represented by 1602 species described in 205 genera all over the world (Kitching *et al.,* 2018). The most comprehensive study of Indian Sphingid remains that of Cotes and Swinhoe (1887) with 187 species and Bell and Scott (1937) with 183 species of which 135 species were reported from the eastern Himalayas. More recent faunal studies of Sphingidae in northeastern India are those of Arandhara (2016) (Digboi, Assam; 31 species), Arandhara *et al.,* (2017) (Tinsukia, Assam; 45 species), Khan and Raina (2017) (Sikkim; 22 species), Bortolin *et al.* (1998) (Himachal Pradesh and Meghalaya (Mandal and Ghosh, 1999); 23 species), Athreya (2013) (Arunachal Pradesh; 66 species), Sanyal *et al.* (2018) (Jammu and Kashmir, Uttarakhand, Himachal Pradesh, Sikkim, West Bengal, Arunachal Pradesh; 184 species). Only two species, *Agrius convolvuli* (Linnaeus, 1758) and *Deilephila elpenor*

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(Linnaeus, 1758), were recorded from Manipur by Mandal and Ghosh (2004). These earlier studies revealed that little work has been done on the taxonomy, ecology, and distribution of Sphingidae in Manipur. Keeping in view, the importance of the family Sphingidae in the region, the present study has been undertaken to know the species diversity in Manipur.

Material and Methods

Study sites: The moths were collected at Shirui hills ranges in the Ukhrul district of Manipur (Figure 1) at an elevation of 1,730 m - 2,590 m asl. The area is located near the boundary of Myanmar to the east, Shirui village in the west, Choithar village in the south, and Sihai village in the north. It has dense tropical forests all over and temperate forests on the hilltops. Sampling localities, along with their GPS coordinates, altitudes, and habitat types are provided in Table 1.

Collection and Preservation: Intensive light trapping was conducted three times a year during March-April (Pre-monsoon), June-July (Monsoon), and September-October (Post-monsoon) during 2016 to 2019. At each sampling site, 3 light traps (type Robinson trap) and a white sheet (3m X 4m dimension) with LED+UV lights were used during the night catch. All the sampled target moths were manually collected and killed in the field, dried by

Table 1. The localities of the trapping moths at Shirui Hills, Manipur, India

Sr no.	Study sites	GPS coordinates		Altitude m asl
		Latitude	Longitude	
1	Shirui Guest House (Site 1)	25.1264°N	94.4357°E	1930
2	Shirui Hills (Site 2)	25.1235°N	94.4407°E	2036
3	Shirui Hills (Site 3)	25.1171°N	94.4456°E	2198
4	Shirui Rest House (Site 4)	25.1112°N	94.4534°E	2425
5	Shirui Kashong (Site 5)	25.1064°N	94.4579°E	2835

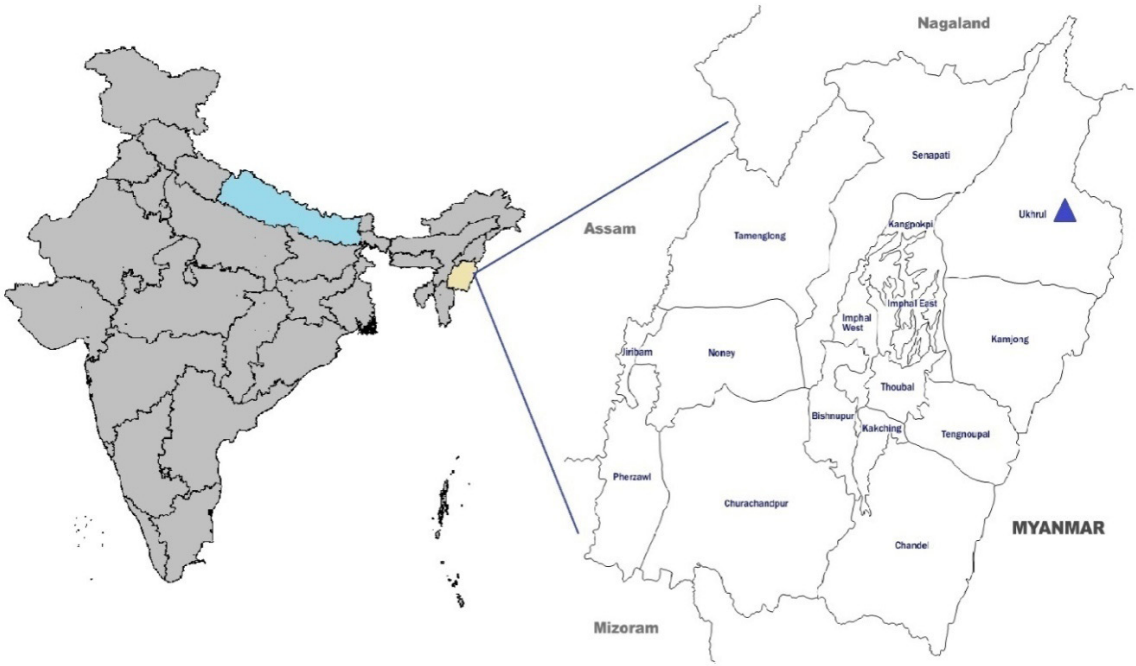

Figure 1. Map showing the study locality Shirui Hills, Ukhrul district, Manipur. (Blue triangle).

silica gel, and kept for later identification. Specimens were photographed using camera (Canon EOS 1100D) in a light box. Genitalia preparations were carried out for those species which are difficult to identify following the standard methods by Robinson (1976). Genitalia were photographed using Olympus SZX16 Stereo Microscope fitted with Promica camera. The photographs are processed using photo editing software (Irfanview vr. 4.54 and CorelDRAW Graphics Suite 2020). All the voucher specimens are deposited in the Museum of Institute of Entomology, Biology Centre, Czech Republic.

Identification of species: The classification and nomenclature follow the Kitching *et al.,* (2018) and Sphingidae Taxonomic Inventory (Kitching, 2020). Identification of the specimens was conducted by comparison with available literature (Bell and Scott, 1937; d'Abrera, 1986; Holloway, 1987; Haruta, 1992, 1994, 1995; Kishida, 1998; Kitching and Cadiou, 2000; Pittaway and Kitching, 2000; Vaglia *et al.,* 2010). The common name of the species follows Chandra *et al.,* (2014). Online repositories available for the moths of Asia (Nakao, 2019), Sphingidae (Pittaway and Kitching, 2020; Pittaway, 2020) were also accessed to confirm the identity of the collected materials.

The recorded global distributions of species were extracted from: D'Abrera (1986), Holloway (1987), Haruta (1992, 1994, 1995), Kitching and Spitzer (1995), Inoue *et al.* (1997), Hogenes and Treadaway (1998), Kitching and Cadiou (2000), Pittaway and Kitching (2000; 2020), Kendrick (2002), Eitschberger and Melichar (2010), Vaglia *et al.* (2010), Fu *et al.* (2013), Rafi *et al.* (2014), Singh and Kitching (2014), Kendrick and Young (2014), Haxaire *et al.* (2017), Ivshin *et al.* (2018), Irungbam and Irungbam (2019), Kishida and Yano, (2020), and for local distributions from: Scott (1941a, 1941b), Mandal and Maulik (1991, 1997), Chandra and Kumar (1992), Chandra (1994), Smetacek (1994, 2008, 2009), Mathew and Rahamathulla (1995), Mandal and Ghosh (1999, 2004), Shubhalaxmi and Chaturvedi (1999), Mandal *et al.* (2000), Chandra and Nima (2007), Majumdar and Kumar (2010), Shubhalaxmi *et al.* (2011), Sambath (2011, 2014), Zolotuhin and Ryabov (2012), Chandra and Sambath (2013), Gurule and Nikam (2013), Ghorpade *et al.* (2013), Chandra *et al.* (2014), Pathania *et al.* (2014), Sharma (2014), Sondhi and Sondhi (2016), Paul *et al.* (2017), Singh *et al.* (2017a, 2017b), Sondhi *et al.* (2018), Kalawate (2018), Shah *et al.* (2018), Sanyal *et al.* (2018), Kathirvelu *et al.* (2019), and Iyer and Kitching (2019).

Results

During the study, 311 specimens belonging to thirty-six species in nineteen genera of family Sphingidae were collected and identified. Among the recorded species, twenty-nine species are reported for the first time from Manipur, of which, *Sphinx oberthueri* (Rothschild and Jordan, 1903) and *Theretra tibetiana* Vaglia and Haxaire, 2010 was recorded for the first time from India. More faunistic surveys are needed in the area so that a complete Sphingidae fauna from Manipur can be compiled.

Systematic Account

In the systematic account, name of the superfamily, family, subfamily, tribe, genus and species is given. Beside this, first reference, material examined, general information on their local (in India) and global distribution, photograph of adults (Figures 1, 2, 3) and male genitalia (Figures 4, 5, 6) is provided.

Superfamily BOMBYCOIDEA Latreille, 1802

Family SPHINGIDAE Latreille, 1802

Subfamily SMERINTHINAE Grote and Robinson, 1865

Tribe ***Smerinthini*** Grote and Robinson, 1865

Genus Craspedortha Mell, 1922

1. *Craspedortha porphyria porphyria* (Butler, 1876) - Purple Hawkmoth (Figure 2: A; Figure 4: A)

1876. *Daphnusa porphyria* Butler, *Trans. zool. Soc. Lond.*, **9**: 640.

Material examined: INDIA, Manipur, Ukhrul District, Shirui Hills, Site 3 (25.1171°N 94.4456°E), 2190 m asl, 24.vii.2019 - 3♂, IJ2288, IJ2289, IJ2290, 13.ix.2019 - 2♂, IJ2291, IJ2427, coll. J.S. Irungbam.

Wingspan: ♂, 55 mm. forewing length: 25 mm.

Distribution: India: Northern India (Chandra *et al.,* 2014); Meghalaya (Mandal and Ghosh, 1999); Sikkim (Sanyal *et al.,* 2018); Uttarakhand (Smetacek, 1994, 2008); West Bengal (Shah *et al.,* 2018); Manipur. *Elsewhere*: Nepal (Kishida, 1998); Bhutan (Irungbam and Irungbam, 2019); Vietnam (Kitching and Spitzer, 1995); central Thailand (Inoue *et al.,* 1997); Laos (Kishida and Yano, 2020); Myanmar, southern China (Pittaway and Kitching, 2020).

Larval hostplants: *Vitex canescens* (Lamiaceae) (Eitschberger and Ihle, 2008).

Figure 2. Image of adult Sphingidae: **A.** *Craspedortha porphyria porphyria* (Butler, 1876); **B.** *Marumba irata* Joicy and Kaye, 1917; **C.** *Callambulyx junonia* (Butler, 1881); **D.** *Clanis undulosa gigantea* Rothschild, 1894; **E.** *Dolbina inexacta* (Walker, 1856); **F.** *Ambulyx liturata* Butler, 1875; **G.** *A. ochracea* Butler, 1885; **H.** *A. sericeipennis sericeipennis* Butler, 1875; **I.** *A. maculifera* Walker, 1866 (female); J. *Sphinx oberthueri* (Rothschild and Jordan, 1903); **K.** *Psilogramma discistriga* (Walker, 1856); **L.** *Agrius convolvuli* (Linnaeus, 1758); **M.** *Acherontia lachesis* (Fabricius, 1798); **N.** *A. styx styx* (Westwood, 1847); **O.** *Daphnis hypothous crameri* Eitschberger and Melichar, 2010; **P.** *Eupanacra sinuata* (Rothschild and Jordan, 1903); **Q.** *Acosmerycoides harterti* (Rothschild, 1895); **R.** *Acosmeryx anceus subdentata* Rothschild and Jordan, 1903.

Remarks: The species is recorded here for the first time from Manipur.

Genus ***Marumba*** Moore, (1882)

2. *Marumba irata* Joicey and Kaye, 1917- Puce Swirled Hawkmoth (Figure 2: B)

1917. *Marumba irata* Joicey and Kaye, *Ann. Mag. nat. Hist.* (Ser. 8), **20**(118): 305.

Material examined: INDIA, Manipur, Ukhrul District, Shirui Hills, Site 1 (25.1264°N 94.4357°E), 1930 m asl, 23.vii.2019 - 1♂, IJ1428, coll. J.S. Irungbam.

Wingspan: ♂, 86 mm. forewing length: 45 mm.

Distribution: India: Manipur, Nagaland (Vaidya *et al.,* 2015); Sikkim (Sanyal *et al.,* 2018). *Elsewhere*: northern Vietnam (Kitching and Spitzer, 1995); Myanmar, China (Pittaway and Kitching, 2020).

Larval hostplants: Unknown in India.

Remarks: Previously regarded as a subspecies of *Marumba gaschkewitschii* (Bremer and Grey, 1853), but reinstated as a species by Eitschberger (2012). We proposed the common name of this hawkmoth as Puce Swirled Hawkmoth, "Puce" being the distinctive purplish brown colour of its wing (suggested by Mr. Peter Smetacek).

Genus ***Callambulyx*** Rothschild and Jordan, 1903

3. *Callambulyx junonia* (Butler, 1881) - Eyed Pink-and-Green Hawkmoth (Figure 2: C)

1881. *Ambulyx junonia* Butler, *Illustr. typ. Spec. Lepid. Heterocera Brit. Mus.,* **5**: 9.

Material examined: INDIA, Manipur, Ukhrul District, Shirui Hills, Site 3 (25.1171°N 94.4456°E), 2190 m asl, 13.ix.2019 - 2♂, IJ2320, IJ2668, coll. J.S. Irungbam.

Wingspan: ♂, 102 mm. forewing length: 49 mm.

Distribution: India: Arunachal Pradesh, Nagaland (Pittaway and Kitching, 2020); Sikkim (Sanyal *et al.,* 2018); Manipur. *Elsewhere*: Bhutan (Irungbam and Irungbam, 2019); Vietnam (Kitching and Spitzer, 1995); China (Pittaway and Kitching, 2020).

Larval hostplants: Unknown in India.

Remarks: The species is recorded here for the first time from Manipur.

Genus Clanis Hübner (1819)

4. *Clanis undulosa gigantea* Rothschild, 1894 - Wavy Velvet Hawkmoth (Figure 2: D)

1894. *Clanis gigantea* Rothschild, *Novit. zool.,* **1**: 96.

Material examined: INDIA, Manipur, Ukhrul District, Shirui Hills, Site 2 (25.1235°N 94.4407°E), 2036 m asl, 12.vii.2016 - 1♂, IJ328, 24.vii.2019 - 1♂, IJ1427; Site 4 (25.1112°N 94.4534°E), 2425 m asl, 25.vii.2019 - 1♂, IJ1607, coll. J.S. Irungbam.

Wingspan: ♂, 150 mm. forewing length: 72 mm.

Distribution: India: Manipur; Meghalaya (Mandal and Ghosh, 1999); Sikkim, Uttarakhand (Sanyal *et al.,* 2018). *Elsewhere*: Nepal (Kishida, 1998); Bhutan (Irungbam and Irungbam, 2019); Thailand (Inoue *et al.,* 1997); Laos (Kishida and Yano, 2020); Vietnam (Kitching and Spitzer, 1995); Peninsular Malaysia (Borneo) (Holloway, 1987).

Larval hostplants: *Lespedeza thompsoni* (Fabaceae) in north eastern India (Bell and Scott, 1937) and *Lespedeza viatorum* (Fabaceae) in Guangdong, China (Mell, 1922).

Remarks: The species is recorded here for the first time from Manipur.

Tribe **Sphingulini** Rothschild and Jordan, 1903

Genus ***Dolbina*** Staudinger, 1877

5. *Dolbina inexacta* (Walker, 1856) - Common Grizzled Hawkmoth (Figure 2: E)

1856. *Macrosila inexacta* Walker, *List Specimens lepid. Insects Colln. Br. Mus*., **8**: 208.

Material examined: INDIA, Manipur, Ukhrul District, Shirui Hills, Site 3 (25.1171°N 94.4456°E), 2190 m asl, 24.vii.2019 - 1♂, IJ1608, 13.ix.2019 - 1♀, IJ1609, coll. J.S. Irungbam.

Wingspan: ♂, 72 mm. forewing length: 34 mm.

Distribution: India: Arunachal Pradesh (Athreya, 2013); Assam (Arandhara *et al.,* 2017); Himachal Pradesh, Punjab (Pathania *et al.,* 2014); Jammu and Kashmir (Sanyal *et al.,* 2018); Jharkhand (Sambath, 2014); Andhra Pradesh, Karnataka, Maharashtra, Tamil Nadu (Shubhalaxmi *et al.,* 2011); Manipur; Meghalaya (Mandal and Ghosh, 1999); Uttarakhand (Smetacek, 1994, 2008). *Elsewhere*: Northern Pakistan (Rafi *et al.,* 2014, Haxaire *et al.,* 2017); Nepal (Kishida, 1998); Bhutan (Irungbam and Irungbam,

2019); China, Myanmar, Thailand (Inoue *et al.,* 1997); Laos (Kishida and Yano, 2020); Vietnam (Kitching and Spitzer, 1995); Peninsular Malaysia (Borneo) (Holloway, 1987); Japan (Pittaway and Kitching, 2020).

Larval hostplants: *Ligustrum robustum*, *Fraxinus* sp., *Osmanthus fragrans* and *Olea* sp. (all in Oleaceae), and *Lonicera* sp. (Caprofoliaceae) in China (Inoue *et al.,* 1997). Unknown in India.

Remarks: The species is recorded here for the first time from Manipur.

Tribe **Ambulycini** Butler, 1876

Genus ***Ambulyx*** Westwood, 1847

6. ***Ambulyx liturata liturata*** Butler, 1875 - Violet Gliding Hawkmoth (Figure 2: F; Figure 4: B)

1875. *Ambulyx liturata* Butler, *Proc. zool. Soc. Lond*., **1875**: 250.

Material examined: INDIA, Manipur, Ukhrul District, Shirui Hills, Site 3 (25.1171°N 94.4456°E), 2190 m asl, 13.ix.2019 - 1♂, IJ2495, coll. J.S. Irungbam.

Wingspan: ♂, 120 mm. Forewing length: 56 mm.

Distribution: India: Arunachal Pradesh (Athreya, 2013); Assam (Arandhara *et al.,* 2017); Jammu and Kashmir, Sikkim (Sanyal *et al.*, 2018); Manipur; Meghalaya (Mandal and Ghosh, 1999); Uttarakhand (Smetacek, 1994, 2008); West Bengal (Shah *et al.,* 2018). *Elsewhere*: Nepal (Kishida, 1998); Bhutan (Irungbam and Irungbam, 2019); Myanmar, Cambodia, China (Pittaway and Kitching, 2020); Hong Kong (Kendrick and Young, 2014); Thailand (Inoue *et al.,* 1997); Vietnam (Kitching and Spitzer, 1995); Laos (Kishida and Yano, 2020).

Larval hostplants: *Quercus* sp. and *Castaniopsis* sp. (both in Fagaceae) in India (Bell and Scott, 1937).

Remarks: The species is recorded here for the first time from Manipur.

7. ***Ambulyx ochracea*** Butler, 1885 - Ochreous Gliding Hawkmoth (Figure 2: G; Figure 4: C)

1885. *Ambulyx ochracea* Butler, *Cistulaent.,* **3**: 113.

Material examined: INDIA, Manipur, Ukhrul District, Shirui Hills, Site 2 (25.1235°N 94.4407°E), 2036 m asl, 12.vii.2016 - 1♂, IJ333; Site 3 (25.1171°N 94.4456°E), 2190 m asl, 24.vii.2019 - 2♂, IJ1148, IJ1642, 13.ix.2019 - 1♂, IJ2497, coll. J.S. Irungbam.

Wingspan: ♂, 96 mm. Forewing length: 46 mm.

Distribution: India: Arunachal Pradesh (Athreya, 2013); Assam (Arandhara *et al.,* 2017); Manipur; Meghalaya (Mandal and Ghosh, 1999); Sikkim (Khan and Raina, 2017); Uttarakhand (Smetacek, 1994, 2008; Sanyal *et al.,* 2018). *Elsewhere*: Nepal (Kishida, 1998); Bhutan (Irungbam and Irungbam, 2019); Hong Kong (Kendrick and Young, 2014); Thailand (Inoue *et al.,* 1997); Vietnam (Kitching and Spitzer, 1995); China, Taiwan, Cambodia, Japan, Korea (Pittaway and Kitching, 2020); Laos (Kishida and Yano, 2020).

Larval hostplants: *Choerospondias fordii* (Anacardiaceae) in India (Bell and Scott, 1937).

Remarks: The species is recorded here for the first time from Manipur.

8. ***Ambulyx sericeipennis sericeipennis*** Butler, 1875 - Common Gliding Hawkmoth (Figure 2: H; Figure 4: D)

1875. *Ambulyx sericeipennis* Butler, *Proc. zool. Soc. Lond.,* **1875**: 252.

Material examined: INDIA, Manipur, Ukhrul District, Shirui Hills, Site 2 (25.1235°N 94.4407°E), 2036 m asl, 24.vii.2019 - 1♂, IJ1391; Site 3, 25.1171°N 94.4456°E, 2190 masl, 24.vii.2019 - 2♂, IJ1149, IJ1150; Site 4 (25.1112°N 94.4534°E), 2425 m asl, 13.ix.2019 - 2♂, 1♀, IJ1604, IJ1605, IJ1606, coll. J.S. Irungbam.

Wingspan: 102 mm. Forewing length: 51 mm.

Distribution: India: Arunachal Pradesh (Athreya, 2013); Assam (Arandhara *et al.,* 2017); Manipur; Meghalaya (Mandal and Ghosh, 1999); Sikkim, Uttarakhand (Sanyal *et al.,* 2018); West Bengal (Shah *et al.,* 2018). *Elsewhere*: Northern Pakistan (Rafi *et al.,* 2014); Nepal (Kishida, 1998); Bhutan (Irungbam and Irungbam, 2019); Myanmar, China, Cambodia, Java, Hong Kong (Pittaway and Kitching, 2020); Thailand (Inoue *et al.,* 1997); Laos (Kishida and Yano, 2020); Vietnam (Kitching and Spitzer, 1995); the Philippines (Hogenes, 1998).

Larval hostplants: *Juglans regia* (Juglandaceae), *Engelhardia spicata* (Juglandaceae), *Elaeocarpus* sp. (Elaeocarpaceae), *Quercus* sp. (Fagaceae), *Myricanagi* sp. (Myricaceae), *Betula alnoides* (Betulaceae) and *Rhus* sp. (Anacardiaceae) in India (Bell and Scott, 1937; Inoue *et al.,* 1997).

Remarks: The species is recorded here for the first time from Manipur.

9. ***Ambulyx maculifera*** Walker, 1866 - Spotted Gliding Hawkmoth (Figure 2: I)

1866. *Ambulyx maculifera* Walker, *List Specimens lepid. Insects Colln Br. Mus.*, **35**: 18S.

Material examined: INDIA, Manipur, Ukhrul District, Shirui Hills, Site 3 (25.1171°N 94.4456°E), 2190 m asl, 13.ix.2019 - 1♀, coll. J.S. Irungbam.

Wingspan: ♀, 115 mm. Forewing length: 56 mm.

Distribution: India: Ladakh, Sikkim (Sanyal *et al.,* 2018); Manipur; Meghalaya (Chandra *et al.,* 2014); Uttarakhand (Smetacek, 1994, 2008); West Bengal (Shah *et al.,* 2018). *Elsewhere*: Nepal (Kishida, 1998).

Larval hostplants: Unknown in India.

Remarks: The species is recorded here for the first time from Manipur.

Subfamily SPHINGINAE Latreille, (1802)

Tribe **Sphingini** Latreille, (1802)

Genus ***Sphinx*** Linnaeus, 1758

10. ***Sphinx oberthueri*** (Rothschild and Jordan, 1903) - Masson Pine Hawkmoth (Figure 2: J; Figure 4: E)

1903. *Hyloicus oberthueri* Rothschild and Jordan, *Novit. zool.,* 9 (suppl.): 119 (key), 149.

Material examined: INDIA, Manipur, Ukhrul District, Shirui Hills, Site 1 (25.1264°N 94.4357°E), 1930 m asl, 23.vii.2019 - 1♂, IJ1429, coll. J.S. Irungbam.

Distribution: India: Manipur. *Elsewhere*: Central and southwestern China, Myanmar, northern Thailand (Inoue *et al.,* 1997).

Diagnosis: Wingspan ♂, 63 mm. forewing length 31 mm. Male genitalia: Uncus elongate, slenderer than in *Sphinx caligineus* (Butler, 1877), slightly dilated before apex, the edge somewhat notched, shortly hooked at apex, the ventral side deeply concave. Gnathos long, sinuate, the lobes slender, subconical, somewhat curved apically. Harpe characteristic, with two short distal processes separated by a rounded sinus, the upper process with one or more marginal teeth, the lower subconical, pointed, slightly curved, narrower and shorter than the upper. Aedeagus produced into a short process that is rounded apically and slightly curved.

Larval hostplants: Pinus massoniana (Pinaceae) in Yunnan, China (Mell, 1922). Unknown in India.

Remarks: The species is recorded here for the first time from Manipur as well as for India.

Genus ***Psilogramma*** Rothschild and Jordan, 1903

11. ***Psilogramma discistriga*** (Walker, 1856) - Large Brown Hawkmoth (Figure 2: K)

1856. *Macrosila discistriga* Walker, *List Specimens lepid. Insects Colln Br. Mus.*, **8**: 209.

Material examined: INDIA, Manipur, Ukhrul District, Shirui Hills, Site 2 (25.1235°N 94.4407°E), 2036 m asl, 23.vii.2019 - 2♂, IJ1416, IJ1812, coll. J.S. Irungbam.

Wingspan: ♂, 131 mm. Forewing length: 62 mm.

Distribution: India: Andaman Islands (Chandra and Kumar, 1992); Arunachal Pradesh (Athreya, 2013); Assam (Arandhara *et al.,* 2017); Delhi (Paul *et al.,* 2017); Punjab (Pathania *et al.,* 2014); Jharkhand (Sambath, 2014); Madhya Pradesh (Chandra *et al.,* 2013); Maharashtra (Kalawate, 2008, Shubhalaxmi *et al.,* 2011); Manipur; Meghalaya (Mandal and Ghosh, 1999); Odisha (Mandal and Maulik, 1991); Sikkim (Dudgeon, 1886); Himachal Pradesh, Karnataka, Tamil Nadu (Chandra *et al.,* 2014); Uttarakhand (Smetacek, 1994, 2008; Sanyal *et al.,* 2018); West Bengal (Shah *et al*., 2018). *Elsewhere*: Nepal (Kishida, 1998); Bhutan (Irungbam and Irungbam, 2019); Bangladesh (Bell and Scott, 1937); Myanmar, central and southern China, Indonesia (Pittaway and Kitching, 2020); Hong Kong (Kendrick and Young, 2014); Vietnam (Kitching and Spitzer, 1995); Laos (Kishida and Yano, 2020); Thailand (Inoue *et al.,* 1997); Malaysia (Borneo) (Holloway, 1987); the Philippines (Hogenes, 1998).

Larval hostplants: *Jasminum* sp. (Oleaceae), *Ligustrum* sp. (Oleaceae), *Tectona grandis* (Lamiaceae), *Vitex negundo* (Lamiaceae), and *Callicarpa arborea* (Lamiaceae) in India (Scott, 1941).

Remarks: Previously, *Psilogramma discistriga* (Walker, 1856) was synonymized with *Psilogramma menephron* by Rothschild and Jordan (1903). It was incorrectly synonymized with *Psilogramma melanomera* (Butler, 1875) by Eitschberger (2001), but later reinstated as a species by Eitschberger (2010). The species is recorded here for the first time from Manipur.

Tribe **Acherontiini** Boisduval, (1875)

Genus ***Agrius*** Hübner, (1819)

12. ***Agrius convolvuli*** **(**Linnaeus, 1758**)** - Convolvulus Hawkmoth (Figure 2: L)

1758. *Sphinx convolvuli* Linnaeus, *Syst. Nat.* (Ed. 10), **1**: 490.

Material examined: INDIA, Manipur, Ukhrul District, Shirui Hills, Site 4 (25.1112°N 94.4534°E), 2425 m asl, 25.vii.2019 - 2♂, IJ1170, IJ1611, coll. J.S. Irungbam.

Wingspan: ♂, 87 mm. Forewing length: 41 mm.

Distribution: India: Andaman and Nicobar Islands (Chandra and Kumar, 1992); Arunachal Pradesh (Athreya, 2013); Assam (Arandhara *et al.,* 2017); Delhi (Paul *et al.,* 2017); Himachal Pradesh, Punjab (Pathania *et al*., 2014); Jammu and Kashmir (Sanyal *et al.,* 2018); Jharkhand (Sambath, 2014, Singh *et al.,* 2017a); Karnataka (Melichar *et al.,* 2018); Madhya Pradesh (Chandra *et al.,* 2013, Choubey *et al.,* 2017), Maharashtra (Shubhalaxmi *et al.,* 2011, Gurule and Nikam, 2013); Manipur; Meghalaya (Mandal and Ghosh, 1999); Odisha (Mandal and Maulik, 1991); Sikkim (Dudgeon, 1886); Tamil Nadu (Kathirvelu *et al*., 2019, Iyer and Kitching, 2019); Uttarakhand, Uttar Pradesh (Smetacek, 1994, 2008); West Bengal (Shah *et al.,* 2018). *Elsewhere*: Throughout the tropical and subtropical Old World; Migratory in large numbers to Mongolia, Siberia and Japan (Holloway, 1987).

Larval hostplants: *Phaseolus* spp. (Fabaceae) in India (Bell and Scott, 1937).

Remarks: The species was earlier recorded from Mao, Senapati district, Manipur by Mandal and Ghosh (2004).

Genus ***Acherontia*** **(**Laspeyres, 1809)

13. ***Acherontia lachesis*** **(**Fabricius, 1798**)** - Greater Death's Head Hawkmoth (Figure 2: M)

1798. *Sphinx lachesis* Fabricius, *Suppl. Ent. Syst*.: 434.

Material examined: INDIA, Manipur, Ukhrul District, Shirui Hills, Site 4 (25.1112°N 94.4534°E), 2425 m asl, 25.vii.2019 - 1♂, IJ1181, coll. J.S. Irungbam.

Wingspan: ♂, 120 mm. Forewing length: 56 mm.

Distribution: India: Andaman and Nicobar Islands (Chandra and Kumar, 1992); Arunachal Pradesh (Athreya, 2013); Assam (Arandhara *et al.,* 2017); Jammu and Kashmir (Sanyal *et al.,* 2018); Jharkhand (Sambath, 2014); Karnataka (Melichar *et al*., 2018); Madhya Pradesh (Chandra *et al.,* 2013, Choubey *et al.,* 2017); Andhra Pradesh, Goa, Gujarat, Maharashtra (Gurule and Nikam, 2013), Manipur, Mizoram, Nagaland (Shubhalaxmi *et al*., 2011); Meghalaya (Mandal and Ghosh, 1999); Odisha (Mandal and Maulik, 1991); Punjab (Pathania *et al.,* 2014); Sikkim (Dudgeon, 1886); Tamil Nadu (Kathirvelu *et al.,* 2019, Iyer and Kitching, 2019); Uttarakhand (Smetacek, 1994, 2008); West Bengal (Shah *et al*., 2018). *Elsewhere*: Eastern Pakistan (Rafi *et al*., 2014); Nepal (Kishida, 1998); Bhutan (Irungbam and Irungbam, 2019); Thailand (Inoue *et al.,* 1997);Laos (Kishida and Yano, 2020); Vietnam (Kitching and Spitzer, 1995); Hong Kong (Kendrick, 2002; Kendrick and Young, 2014); Myanmar, China, Taiwan (Fu *et al.* 2013; Wu *et al*., 2020); Malaysia (Holloway, 1987); Indonesia, southern Japan, Papua New Guinea, the Hawaiian Islands, Moluccas (Holloway, 1987); the Philippines (Hogenes, 1998).

Larval host-plants: *Erythrina* spp. (Fabaceae), *Jasminum* spp. (Oleaceae), *Solanum tuberosum* (Solanaceae), *Nicotiana tabacum* (Solanaceae), *Tectona grandis* (Lamiaceae), *Datura* sp. (Solanaceae) and other plants (Scott, 1941).

Remarks: The species is recorded here for the first time from Manipur.

14. ***Acherontia styx styx*** **(**Westwood, 1847**)** - Lesser Death's Head Hawkmoth (Figure 2: N)

1847. *Sphinx (Acherontia) styx* Westwood, *Cabinet oriental Ent.:* (88), pl. 42, fig. 3.

Material examined: INDIA, Manipur, Ukhrul District, Shirui Hills, Site 4 (25.1112°N 94.4534°E), 2425 m asl, 25.vii.2019 - 1♂, IJ1610, coll. J.S. Irungbam.

Wingspan: ♂, 100 mm. Forewing length: 48 mm.

Distribution: India: Andaman and Nicobar Islands (Chandra and Kumar, 1992); Arunachal Pradesh (Athreya, 2013); Assam (Arandhara *et al*., 2017); Delhi (Paul *et al.,* 2017); Himachal Pradesh, Meghalaya (Bortolin *et al.,* 1998); Jammu and Kashmir (Sanyal *et al.,* 2018); Jharkhand (Sambath, 2014); Karnataka (Melichar *et al.,* 2018); Madhya Pradesh (Chandra *et al.*, 2013, Choubey *et al.,* 2017); Maharashtra (Shubhalaxmi *et al.,* 2011, Gurule and Nikam, 2013); Manipur; Odisha (Mandal and Maulik, 1991); Rajasthan (Sharma, 2014); Sikkim (Dudgeon, 1886); Tamil Nadu (Kathirvelu *et al.,*

2019, Iyer and Kitching, 2019); Uttarakhand (Smetacek, 1994, 2008); West Bengal (Shah *et al*., 2018). *Elsewhere*: Pakistan (Rafi *et al.*, 2014); Nepal (Kishida, 1998); Bhutan (Irungbam and Irungbam, 2019); Bangladesh (Bell and Scott, 1937); northern Thailand (Inoue *et al.,* 1997); Laos (Kishida and Yano, 2020); Myanmar, China, the Russian Far East (Pittaway and Kitching, 2020); Taiwan (Wu *et al*., 2020); Moluccas (Holloway, 1987).

Larval hostplants: *Sesamum indicum* (Pedaliaceae) in India (Bell and Scott, 1937).

Remarks: The species is recorded here for the first time from Manipur.

Subfamily MACROGLOSSINAE Harris, 1839

Tribe **Macroglossini** Harris, 1839

Genus ***Daphnis*** Hübner, (1819)

15. *Daphnis hypothous crameri* Eitschberger and Melichar, 2010 - Jade Hawkmoth (Figure. 2: O)

2010. *Daphnis hypothous crameri* Eitschberger and Melichar, *European Entomologist,* **2**: 67.

Material examined: INDIA, Manipur, Ukhrul District, Shirui Hills, Site 2 (25.1235°N 94.4407°E), 2036 m asl, 24.vii.2019 - 1♂, IJ1412, coll. J.S. Irungbam.

Wingspan: ♂, 110 mm. Forewing length: 53 mm.

Distribution: India: Arunachal Pradesh (Athreya, 2013); Andaman and Nicobar Islands, Assam, Andhra Pradesh, Gujarat, Madhya Pradesh (Chandra *et al.,* 2014); Jharkhand (Sambath, 2014); Karnataka (Melichar *et al.,* 2018); Manipur; Meghalaya (Mandal and Ghosh, 1999); Odisha (Mandal and Maulik 1991); Sikkim (Dudgeon, 1886); Tamil Nadu (Iyer and Kitching, 2019); Uttarakhand (Smetacek, 1994, 2008; Sanyal *et al.,* 2018); West Bengal (Shah *et al*., 2018). *Elsewhere*: Nepal (Kishida, 1998); Bhutan (Irungbam and Irungbam, 2019); Hong Kong (Kendrick and Young, 2014); Thailand (Inoue *et al*., 1997); Laos (Kishida and Yano, 2020); Malaysia (Holloway, 1987); Taiwan (Wu *et al.,* 2020); Sri Lanka, Myanmar, southern China, Indonesia (Pittaway and Kitching, 2020); the Philippines (Hogenes, 1998).

Larval hostplants: *Cinchona* spp., *Wendlandia* spp. and *Uncaria* spp. (all Rubuaceae) in India (Bell and Scott, 1937).

Remarks: The species is recorded here for the first time from Manipur.

Genus ***Eupanacra*** Cadiou and Holloway, 1989

16. *Eupanacra sinuata* **(**Rothschild and Jordan, 1903**)** - Sinuous Rippled Hawkmoth (Figure 2: P)

1903. *Panacra sinuata* Rothschild and Jordan, *Novit. zool.,* **9** (suppl.): 539.

Material examined: INDIA, Manipur, Ukhrul District, Shirui Hills, Site 1 (25.1264°N 94.4357°E), 1930 m asl, 24.vii.2019 - 2♂, IJ1182, IJ1652; Site 2 (25.1235°N 94.4407°E), 2036 m asl, 13.ix.2019 - 1♂, IJ2297, coll. J.S. Irungbam.

Wingspan: ♂, 66 mm. Forewing length: 32 mm.

Distribution: India: Arunachal Pradesh (Sanyal *et al.,* 2018); Assam, Himachal Pradesh, Sikkim (Chandra *et al*., 2014); Manipur; Meghalaya (Mandal and Ghosh, 1999); Uttarakhand (Smetacek, 1994, 2008; Sanyal *et al.,* 2018). *Elsewhere*: Nepal (Kishida, 1998); China (Pittaway and Kitching, 2020); Laos (Kishida and Yano, 2020); northern Thailand (Inoue *et al*., 1997); Vietnam (Kitching and Spitzer, 1995).

Larval hostplants: Unknown in India.

Remarks: The species is recorded here for the first time from Manipur.

Genus ***Acosmerycoides*** Mell, 1922

17. *Acosmerycoides harterti* **(**Rothschild, 1895**)** - Hartert's Hawkmoth (Figure 2: Q; Figure 4: F)

1895. *Ampelophaga harterti* Rothschild, *Dt. ent. Z., Iris,* **7**: 299.

Material examined: INDIA, Manipur, Ukhrul District, Shirui Hills, Site 3 (25.1171°N 94.4456°E), 2190 m asl, 13.ix.2019 - 1♂, IJ2500, coll. J.S. Irungbam.

Wingspan: ♂, 84 mm. Forewing length: 41 mm.

Distribution: India: Arunachal Pradesh (Athreya, 2013; Sanyal *et al.,* 2018); Assam (Arandhara, 2016); Manipur. *Elsewhere*: Bhutan (Irungbam and Irungbam, 2019); Myanmar, China (Pittaway and Kitching, 2020); Thailand (Inoue *et al*., 1997); Vietnam (Kitching and Spitzer, 1995); Laos (Kishida and Yano, 2020).

Larval hostplants: *Vitis* spp. (Vitaceae) and *Saurauia* spp. (Actinidiaceae) in India (Bell and Scott, 1937).

Remarks: The species is recorded here for the first time from Manipur.

Figure 3. Image of adult Sphingidae: **A.** *Acosmeryx naga naga* (Moore, (1858)); **B.** *A. pseudonaga* Butler, 1881; **C.** *Deilephila elpenor macromera* (Butler, 1875); **D.** *Hippotion celerio* (Linnaeus, 1758); **E.** *H. rosetta* (Swinhoe, 1892); **F.** *Theretra alecto* (Linnaeus, 1758); **G.** *T. clotho clotho* (Drury, 1773); **H.** *T. tibetiana* Vaglia and Haxaire, 2010; **I.** *T. lucasii* (Walker, 1856); **J.** *T. nessus nessus* (Drury, 1773); **K.** *T. oldenlandiae oldenlandiae* (Fabricius, 1775); **L.** *T. pallicosta* (Walker, 1856); **M.** *Cechetra lineosa* (Walker, 1856); **N.** *C. minor* (Butler, 1875); **O.** *Rhagastis albomarginatus albomarginatus* (Rothschild, 1894); **P.** *R. castor aurifera* (Butler, 1875); **Q.** *R. confusa* Rothschild and Jordan, 1903; **R.** *R. olivacea* (Moore, 1857).

Genus ***Acosmeryx*** Boisduval, (1875)

18. ***Acosmeryx anceus subdentata*** Rothschild and Jordan, 1903 - Rosy Forest Hawkmoth (Figure 2: R)

1903. *Acosmeryx anceus subdentata* Rothschild and Jordan, *Novit. zool.,* **9** (suppl.): 528.

Material examined: INDIA, Manipur, Ukhrul District, Shirui Hills, Site 3 (25.1171ºN 94.4456ºE), 2190 m asl, 24.vii.2019 - 2♂, IJ1581, IJ1623, coll. J.S. Irungbam.

Wingspan: ♂, 75 mm. Forewing length: 34 mm.

Distribution: India: Arunachal Pradesh (Athreya, 2013); Assam (Arandhara, 2016); Himachal Pradesh (Chandra *et al.,* 2014); Jharkhand (Sambath, 2014); Karnataka (Melichar *et al*., 2018); Kerala (Sondhi *et al.,* 2018); Manipur; Meghalaya (Mandal and Ghosh, 1999); Sikkim (Dudgeon, 1886); Tamil Nadu, Uttarakhand (Smetacek, 1994, 2008); West Bengal (Shah *et al*., 2018). *Elsewhere*: Bhutan (Irungbam and Irungbam, 2019); Nepal (Kishida, 1998); Hong Kong (Kendrick and Young, 2014); Thailand (Inoue *et al*., 1997); Vietnam (Kitching and Spitzer, 1995); Laos (Kishida and Yano, 2020); Malaysia (Borneo) (Holloway, 1987); China, Indonesia (Pittaway and Kitching, 2020); the Philippines (Hogenes, 1998).

Larval hostplants: *Leea* spp., *Cayratia* spp., *Cissus* spp. and *Vitis* spp. (all in Vitaceae) (Inoue *et al.,* 1997).

Remarks: The species is recorded here for the first time from Manipur.

19. ***Acosmeryx naga naga*** **(**Moore, 1858) - Common Forest Hawkmoth (Figure 3: A)

1858. *Philampelus naga* Moore, in Horsfield and Moore, *Cat. lepid. Insects Mus. Hon. East-India Company,* **1**: 271.

Material examined: INDIA, Manipur, Ukhrul District, Shirui Hills, Site 1 (25.1264ºN 94.4357ºE), 1930 m asl, 23.vii.2019 - 6♂, IJ1393, IJ1394, IJ1395, IJ1396, IJ1397, IJ1430; Site 2 (25.1235ºN 94.4407ºE), 2036 m asl, 13.ix.2019 - 2♂, IJ1392, IJ2336; Site 3 (25.1171ºN 94.4456ºE), 2190 m asl, 24.vii.2019 - 2♂, IJ1151, 1152; Site 4 (25.1112ºN 94.4534ºE), 2425 m asl, 12.vii.2016- 2♂, IJ336, 1J337, 25.vii.2019 - 2♂, 1♀, IJ1582, IJ1583, IJ584, coll. J.S. Irungbam.

Wingspan: ♂, 104 mm. Forewing length: 50 mm.

Distribution: India: Arunachal Pradesh (Athreya, 2013); Himachal Pradesh, Ladakh, Sikkim, Uttarakhand (Sanyal *et al.,* 2018); Manipur; Meghalaya (Mandal and Ghosh, 1999); Uttar Pradesh (Smetacek, 1994, 2008); West Bengal (Shah *et al*., 2018). *Elsewhere*: Northern Pakistan (Rafi *et al*., 2014); Nepal (Kishida, 1998); Bhutan (Irungbam and Irungbam, 2019); northern Myanmar, Thailand (Inoue *et al*., 1997); Laos (Kishida and Yano, 2020); Vietnam (Kitching and Spitzer, 1995); peninsular Malaysia (Borneo) (Holloway, 1987); Taiwan (Fu *et al.,* 2013, Wu *et al*., 2020).

Larval hostplants: Unknown in India.

Remarks: The species is recorded here for the first time from Manipur.

20. ***Acosmeryx pseudonaga*** Butler, 1881 - False Common Forest Hawkmoth (Figure 3: B)

1881. *Acosmeryx pseudonaga* Butler, *Illustr. typ. Spec. Lepid. Heterocera Brit. Mus.*, **5**: 2.

Material examined: INDIA, Manipur, Ukhrul District, Shirui Hills, Site 1 (25.1264ºN 94.4357ºE), 1930 m asl, 23.vii.2019 - 3♂, IJ1814, IJ1845, IJ1846; Site 3 (25.1171ºN 94.4456ºE), 2190 m asl, 13.ix.2019 - 1♀, IJ2499; Site 4 (25.1112ºN 94.4534ºE), 2425 m asl, 12.vii.2016- 2♂, IJ338, IJ339, 25.VII.2019 - 1♂, IJ1585; Site 5 (25.1069ºN 94.4456ºE), 2835 m asl, 25.vii.2019 - 1♂, IJ1180, coll. J.S. Irungbam.

Wingspan: ♂, 103 mm. Forewing length: 46 mm.

Distribution: India: Arunachal Pradesh (Athreya, 2013); Manipur; Tripura (Mandal *et al*. 2000). *Elsewhere*: Bhutan (Irungbam and Irungbam, 2019); Hong Kong (Kendrick and Young, 2014); Thailand (Inoue *et al.,* 1997); Laos (Kishida and Yano, 2020).

Larval hostplants: Unknown in India.

Remarks: The species is recorded here for the first time from Manipur.

Genus ***Deilephila*** **(**Laspeyres, 1809)

21. ***Deilephila elpenor macromera*** **(**Butler, 1875**)** - Large Elephant Hawkmoth (Figure 3: C)

1875. *Choerocampa macromera* Butler, *Proc. zool. Soc. Lond.,* **1875**: 7.

Material examined: INDIA, Manipur, Ukhrul District, Shirui Hills, Site 1 (25.1264ºN 94.4357ºE), 1930 m asl, 23.vii.2019 - 1♂, IJ1415; Site 2 (25.1235ºN 94.4407ºE),

2036 m asl, 12.vii.2016 - 5♂, IJ329, IJ330, IJ331, IJ829, IJ830, 24.vii.2019 - 3♂, IJ1413, IJ1414, IJ1818; Site 4 (25.1112°N 94.4534°E), 2425 m asl, 25.vii.2019 - 4♂, IJ1598, IJ1599, IJ1600, IJ1601, coll. J.S. Irungbam.

Wingspan: ♂, 78 mm. Forewing length: 37 mm.

Distribution: India: Bihar, Himachal Pradesh (Chandra *et al.,* 2014); Manipur (Mandal and Ghosh, 2004); Meghalaya (Mandal and Ghosh, 1999); Sikkim, Uttarakhand (Sanyal *et al.,* 2018); West Bengal (Shah *et al.*, 2018). *Elsewhere*: Nepal (Kishida, 1998); Bhutan (Irungbam and Irungbam, 2019); northern Myanmar, southern China (Pittaway and Kitching, 2020); northern Thailand (Inoue *et al.,* 1997); northern Vietnam (Kitching and Spitzer, 1995).

Larval hostplants: *Arisaema* spp. and *Amorphophallus* spp. (both Araceae) in India (Bell and Scott, 1937).

Remarks: The species was earlier recorded from Mao, Senapati district, Manipur by Mandal and Ghosh (2004).

Genus ***Hippotion*** Hübner, (1819)

22. *Hippotion celerio* **(**Linnaeus, 1758**)** - Silver striped Hawkmoth (Figure 3: D)

1758. *Sphinx celerio* Linnaeus, *Syst. Nat.* (Ed. 10), **1**: 491.

Material examined: INDIA, Manipur, Ukhrul District, Shirui Hills, Site 3 (25.1171°N 94.4456°E), 2190 m asl, 13.ix.2019 - 1♂, IJ2296, coll. J.S. Irungbam.

Wingspan: ♂, 63 mm. Forewing length: 29 mm.

Distribution: India: Andaman and Nicober Islands (Chandra and Kumar, 1992); Arunachal Pradesh (Athreya, 2013, Kaleka *et al*., 2018); Delhi (Paul *et al.*, 2017); Gujarat, Himachal Pradesh, Madhya Pradesh, Uttar Pradesh (Chandra *et al.,* 2014); Jammu and Kashmir, Sikkim, Uttarakhand (Sanyal *et al.,* 2018, Kaleka *et al*., 2018); Karnataka (Melichar *et al.,* 2018, Kaleka *et al*., 2018); Maharashtra (Shubhalaxmi *et al.,* 2011, Gurule and Nikam, 2013); Manipur; Meghalaya (Mandal and Ghosh, 1999); Punjab (Pathania *et al.,* 2014, Kaleka *et al*., 2018); Rajasthan (Sharma, 2014); Tamil Nadu (Iyer and Kitching, 2019); West Bengal (Shah *et al.,* 2018). *Elsewhere*: Tropical Africa, Asia, Australia (Pittaway and Kitching, 2020).

Larval hostplants: Unknown in India.

Remarks: The species is recorded here for the first time from Manipur.

23. *Hippotion rosetta* **(**Swinhoe, 1892**)** - Swinhoe's Striated Hawkmoth (Figure 3: E)

1892. *Choerocampa rosetta* Swinhoe, *Cat. east. and Aust. Lepid. Heterocera Colln Oxf. Univ. Mus.,* **1**: 16.

Material examined: INDIA, Manipur, Ukhrul District, Shirui Hills, Site 3 (25.1171°N 94.4456°E), 2190 m asl, 24.vii.2019 - 1♂, IJ2295, coll. J.S. Irungbam.

Wingspan: ♂, 56 mm. Forewing length: 32 mm.

Distribution: India: Andaman and Nicobar Islands (Chandra and Kumar, 1992); Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Goa, Gujarat, Haryana, Himachal Pradesh, Sikkim, Lakshadweep Island, Maharashtra, Uttar Pradesh, West Bengal (Shubhalaxmi *et al.,* 2011); Karnataka (Melichar *et al.,* 2018); Manipur; Meghalaya (Mandal and Ghosh, 1999); Odisha (Mandal and Maulik, 1991); Tamil Nadu (Iyer and Kitching, 2019); Uttarakhand (Smetacek, 1994, 2008; Sanyal *et al.,* 2018). *Elsewhere*: Southern Pakistan (Rafi *et al.,* 2014); Bhutan (Irungbam and Irungbam, 2019); Thailand (Inoue *et al.,* 1997); Hong Kong (Kendrick and Young, 2014); Sri Lanka, eastern Indonesia, southern China, southern Japan, the Maldives Islands, the Solomon Islands, the Torres Straits of New Guinea, Hawaii (Pittaway and Kitching, 2020); Taiwan (Fu *et al*., 2013, Wu *et al*., 2020); the Philippines (Hogenes, 1998).

Larval hostplants: Unknown in India.

Remarks: The species is recorded here for the first time from Manipur.

Genus ***Theretra*** Hübner, (1819**)**

24. *Theretra alecto alecto* **(**Linnaeus, 1758**)** - Levant Hunter Hawkmoth (Figure 3: F)

1758. *Sphinx alecto* Linnaeus, *Syst. Nat.* (Ed. 10), **1**: 492.

Material examined: INDIA, Manipur, Ukhrul District, Shirui Hills, Site 1 (25.1264°N 94.4357°E), 1930 m asl, 23.vii.2019 - 1♂, IJ1426, coll. J.S. Irungbam.

Wingspan: ♂, 65 mm. Forewing length: 31 mm.

Distribution: India: Andaman Islands (Chandra and Kumar, 1992);Arunachal Pradesh (Athreya, 2013); Assam, Himachal Pradesh, Manipur, Maharashtra, Nagaland, Tamil Nadu, Uttar Pradesh (Shubhalaxmi *et al.,* 2011); Jammu and Kashmir (Sanyal *et al.,* 2018); Jharkhand (Singh *et al.,* 2017a); Karnataka (Melichar *et al.,* 2018); Madhya Pradesh (Choubey *et al.,* 2017); Meghalaya

(Mandal and Ghosh, 1999); Punjab (Pathania *et al.,* 2014); Sikkim (Dudgeon, 1886); Uttarakhand (Smetacek, 1994, 2008); West Bengal (Shah *et al.,* 2018). *Elsewhere*: Pakistan (Rafi *et al.,* 2014); Nepal (Kishida, 1998); Bhutan (Irungbam and Irungbam, 2019); Hong Kong (Kendrick and Young, 2014); the Philippines (Hogenes, 1998); Sri Lanka, China, Japan, Indonesia, Greece, Bulgaria, Turkey, Iran, Turkmenistan, Uzbekistan, Kyrgyzstan, Afghanistan, Iraq, Lebanon, Israel, Egypt (Pittaway and Kitching, 2020).

Larval hostplants: *Vitis* sp., *Parthenocissus, Cissus* sp., *Leea* sp. (all Vitaceae), *Rubia* sp., *Psychotria* sp. (both Rubiaceae), *Saurauia* sp. (Actinidiaceae), *Dillenia* sp. and *Tetracera* sp. (both Dilleniaceae) (Pittaway and Kitching, 2020).

Remarks: Shubhalaxmi *et al.* (2011) have mentioned the presence of the species in Manipur. The present record from Shirui Hills, confirms its presence in Manipur.

25. *Theretra clotho clotho* **(**Drury, 1773**)** - Common Hunter Hawkmoth (Figure 3: G; Figure 5: A)

1773. *Sphinx clotho* Drury, *Illust. nat. Hist. exot. Insects,* 2: index (91).

Material examined: INDIA, Manipur, Ukhrul District, Shirui Hills, Site 1 (25.1264°N 94.4357°E), 1930 m asl, 23.vii.2019 – 4♂, IJ1421, IJ1422, IJ1423, IJ1424; Site 3 (25.1171°N 94.4456°E), 2190 m asl, 24.vii.2019 – 4♂, IJ1164, IJ1165, IJ1167, IJ1168; Site 4 (25.1112°N 94.4534°E), 2425 m asl, 25.vii.2019 – 1♂, IJ1602, coll. J.S. Irungbam.

Diagnosis: Wingspan ♂, 86 - 96 mm. forewing length 42 - 46 mm. Male genitalia (Figure 5: A): Uncus short and massive. The lateral sétigeres lobes are broad, not very raised and strongly ciliate, but the cilia are short. The apex of the uncus is slightly curved. The harps are characteristic long and spatulate, their surface is cracked. The outer edge is irregularly domed, sometimes rounded and others almost triangular. The internal edge wears a double sclerotic and dentate sheet. Each leaflet is well developed but remains narrow throughout its length. They are clearly toothed. The teeth are small and evenly spaced but vary widely in size and shape.

Distribution: India: Andaman Island (Chandra and Kumar, 1992); Arunachal Pradesh (Athreya, 2013); Assam (Arandhara *et al.,* 2017); Gujarat, Himachal Pradesh, Maharashtra, Manipur, Nagaland, Sikkim, Tamil Nadu, Uttar Pradesh (Shubhalaxmi *et al.,* 2011); Ladakh (Sanyal *et al.,* 2018), Jharkhand (Sambath, 2014, Singh *et al.*, 2017a), Karnataka (Melichar *et al.,* 2018), Kerala (Sondhi *et al.,* 2018), Meghalaya (Mandal and Ghosh, 1999), Odisha (Mandal and Maulik 1991), Punjab (Pathania *et al.,* 2014), Uttarakhand (Smetacek, 1994, 2008); West Bengal (Shah *et al.,* 2018). *Elsewhere*: Northern Pakistan (Rafi *et al.,* 2014); Nepal (Kishida, 1998); Bhutan (Irungbam and Irungbam, 2019); Laos (Kishida and Yano, 2020); Hong Kong (Kendrick and Young, 2014); Taiwan (Fu *et al.,* 2013); Sri Lanka, Myanmar, China, Japan, Indonesia, Sundaland (Pittaway and Kitching, 2020); the Philippines (Hogenes, 1998).

Larval hostplants: Unknown in India.

Remarks: Shubhalaxmi *et al.* (2011) have mentioned the presence of the species in Manipur. The present record from Shirui Hills, confirms its presence in Manipur.

26. *Theretra tibetiana* Vaglia and Haxaire, 2010 -Tibetian Hunter Hawkmoth (Figure 3: H; Figure 5: B)

2010. *Theretra tibetiana* Vaglia and Haxaire, in Vaglia, Haxaire, Kitching and Liyous, *European Entomologist,* **3**(1): 21.

Material examined: INDIA, Manipur, Ukhrul District, Shirui Hills, Site 3 (25.1171°N 94.4456°E), 2190 m asl, 24.vii.2019 - 1♂, IJ1163, 13.ix.2019 - 1♂, IJ1425, coll. J.S. Irungbam.

Diagnosis: Wingspan ♂, 82 - 86 mm. forewing length 39 - 41 mm. Male genitalia (Figure 5: B): In lateral view the uncus is similar to the *clotho*, but its apex is not so curved and is interrupted more abruptly. The harp is globular, outer edge is rounded, but usually invaginates just before the apex. The inner edge bears the double serrated layer and sclerotic characteristic of *clotho,* but this double leaf is totally shifted and crushed towards the apex. It is raised and is slightly curved towards the base of the valve. Only the larger apical teeth are visible. There are usually 4 on the outer leaflet and 2 or 3 on the internal leaflet. At *clotho* the sheets are wide, semi-transparent, are positioned lower on the inner edge and are finely toothed over their entire length. The apical portion is very little or not raised or curved ventrally. The outer edge is regularly domed.

Distribution: India: Manipur. *Elsewhere*: Bhutan (Irungbam and Irungbam, 2019); Hong Kong (Kendrick and Young, 2014); China, South Korea, Japan, northern

Vietnam, northern Laos,northern Thailand (Vaglia *et al*., 2010); Taiwan (Wu *et al*., 2020).

Larval hostplants: Unknown in India.

Remarks: The species is recorded here for the first time from Manipur as well as for India.

27. *Theretra lucasii* (Walker, 1856)- Lucas's Hunter Hawkmoth (Figure 3: I)

1856. *Chaerocampa (sic) lucasii* Walker, *List Specimens lepid. Insects Colln Br. Mus.* **8**: 141.

Material examined: INDIA, Manipur, Ukhrul District, Shirui Hills, Site 4 (25.1112°N 94.4534°E), 2425 m asl, 12.vii.2016 - 1♂, IJ340, coll. J.S. Irungbam.

Wingspan: ♂, 78 mm. forewing length: 37 mm.

Distribution: India: Andaman and Nicober Islands (Chandra and Kumar, 1992); Arunachal Pradesh (Athreya, 2013); Assam (Arandhara *et al.,* 2017); Jammu and Kashmir, Sikkim (Sanyal *et al.,* 2018); Karnataka (Melichar *et al.,* 2018); Kerala (Sondhi *et al.,* 2018); Manipur; Meghalaya (Mandal and Ghosh, 1999); Tamil Nadu (Iyer and Kitching, 2019); West Bengal (Shah *et al.,* 2018). *Elsewhere*: Nepal (Kishida, 1998); Hong Kong (Kendrick and Young, 2014); Sri Lanka, Myanmar, eastern China, Sumatra, Borneo, Java, the Lesser Sunda Islands (Pittaway and Kitching, 2020); the Philippines (Hogenes, 1998).

Larval hostplants: *Impatiens* spp. (Balsaminaceae), *Lagerstroemia* spp. (Lythraceae), *Vitis* spp. (Vitaceae) and *Begonia* spp. (Begoniaceae) in India (Bell and Scott, 1937).

Remarks: The species *T. lucasii* was earlier considered as subspecies of *T. latreillii*, but reinstated distinct species by Moulds *et al.* (2020). Now the species which flies in India through China, Southeast Asia up to Indonesia are *T. lucasii. T. lucasii* is replaced in the Maluku Islands by *T. latreillii prattorum* Clark, 1924 and in New Guinea, Australia, the Bismarck Archipelago, and the Solomon Islands by *T. latreillii latreillii* (Macleay, 1826) (Moulds *et al.* 2020). The species is recorded here for the first time from Manipur.

28. *Theretra nessus nessus* (Drury, 1773) - Orange-Sided Hunter Hawkmoth (Figure 3: J)

1773. *Sphinx nessus* Drury, *Illust. nat. Hist. exot. Insects,* 2: index (91).

Material examined: INDIA, Manipur, Ukhrul District, Shirui Hills, Site 3 (25.1171°N 94.4456°E), 2190 m asl, 13.ix.2019 - 1♂, IJ2498, coll. J.S. Irungbam.

Wingspan: ♂, 107 mm. Forewing length: 49 mm.

Distribution: India: Andaman and Nicobar Islands (Chandra 1994); Arunachal Pradesh, Uttarakhand (Sanyal *et al.,* 2018); Assam (Arandhara *et al.,* 2017); Andhra Pradesh, Gujarat, Goa, Jammu and Kashmir, Madhya Pradesh, Maharashtra, Manipur, Nagaland, Uttar Pradesh (Shubhalaxmi *et al.,* 2011); Jharkhand (Sambath, 2014, Singh *et al.,* 2017a, 2017b); Kerala (Sondhi *et al.,* 2018); Karnataka (Melichar *et al.,* 2018); Meghalaya (Mandal *et al.,* 2000); Himachal Pradesh, Punjab (Pathania *et al.,* 2014); Rajasthan (Sharma, 2014); Sikkim (Dudgeon, 1886, Khan and Raina, 2017); Tamil Nadu (Iyer and Kitching, 2019);Tripura (Mandal *et al.,* 2000); West Bengal (Shah *et al.,* 2018). *Elsewhere*: Bhutan (Irungbam and Irungbam, 2019); Nepal (Kishida, 1998); Myanmar, southern China, South Korea, Japan, Singapore, Indonesia, Malaysia, Sundaland (Pittaway and Kitching, 2020); Hong Kong (Kendrick, 2002); Thailand (Inoue *et al.,* 1997); Vietnam (Kitching and Spitzer, 1995); Taiwan (Wu *et al.,* 2020); the Philippines (Hogenes, 1998).

Larval host-plants: *Amaranthus* sp. (Amaranthaceae), *Barringtonia* sp. (Lecythidaceae), *Dioscorea* sp. (Dioscoreaceae), *Amorphophallus* sp. (Araceae), *Impatiens* sp. (Balsaminaceae), *Citrullus* sp. (Cucurbitaceae), *Boerhavia* sp. (Nyctaginaceae), *Knoxia* sp. (Rubiaceae), *Morinda* sp. (Rubiaceae), *Oldenlandia* sp. (Rubiaceae), *Pongamia* sp. (Fabaceae), *Spermacoce* sp. (Rubiaceae), *Glossostigma* sp. (Phrymaceae) and *Camellia* sp. (Theaceae) (Pittaway and Kitching, 2020).

Remarks: Shubhalaxmi *et al.* (2011) have mentioned the presence of the species in Manipur. The present record from Shirui Hills, confirms its presence in Manipur.

29. *Theretra oldenlandiae oldenlandiae* (Fabricius, 1775) - White-Banded Hunter Hawkmoth (Figure 3: K)

1775. *Sphinx oldenlandiae* Fabricius, *Syst. Ent*.: 542.

Material examined: INDIA, Manipur, Ukhrul District, Shirui Hills, Site 1 (25.1264°N 94.4357°E), 1930 m asl, 20.vi.2019 - 1♂, IJ2501, 23.vii.2019 - 1♂, IJ1420, coll. J.S. Irungbam.

Wingspan: ♂, 62 mm. Forewing length: 30 mm.

Distribution: India: Andaman Islands (Chandra, 1994); Arunachal Pradesh (Athreya, 2013); Assam (Arandhara *et al.,* 2017); Chattishgarh, Gujarat, Jammu and Kashmir, Maharashtra, Manipur, Nagaland, Tamil Nadu, Uttar Pradesh (Shubhalaxmi *et al.,* 2011); Delhi (Paul *et al.,* 2017); Himachal Pradesh, Punjab (Pathania *et al.,* 2014); Jharkhand (Sambath, 2014, Singh *et al.,* 2017a, 2017b); Karnataka (Melichar *et al.,* 2018); Madhya Pradesh (Chandra *et al.,* 2013); Meghalaya (Mandal and Ghosh, 1999); Sikkim (Khan and Raina, 2017); Tripura (Mandal *et al.,* 2000); Uttarakhand (Smetacek, 1994, 2008); West Bengal (Shah *et al.,* 2018). *Elsewhere*: Pakistan (Rafi *et al.,* 2014); Nepal (Kishida, 1998); Bhutan (Irungbam andIrungbam, 2019); Sri Lanka, northern Afghanistan, Myanmar, China, South Korea, Japan, the Solomon Islands, New Guinea, eastern Russia (Pittaway and Kitching, 2020); Laos (Kishida and Yano, 2020); Hong Kong (Kendrick and Young, 2014); the Philippines (Hogenes, 1998).

Larval hostplants: *Careya* spp. (Lecythidaceae) in India (Bell and Scott, 1937).

Remarks: Shubhalaxmi *et al.* (2011) have mentioned the presence of the species in Manipur. The present record from Shirui Hills, confirms its presence in Manipur.

30. *Theretra pallicosta* **(**Walker, 1856**)** - White-Edged Hunter Hawkmoth (Figure 3: L)

1856. *Chaerocampa pallicosta* Walker, *List Specimens lepid. Insects Colln Br. Mus*., **8**: 145.

Material examined: INDIA, Manipur, Ukhrul District, Shirui Hills, Site 3 (25.1171ºN 94.4456ºE), 2190 m asl, 24.vii.2019 - 1♂, IJ1169, coll. J.S. Irungbam.

Wingspan: ♂, 77 mm. forewing length: 37 mm.

Distribution: India: Arunachal Pradesh (Athreya, 2013); Karnataka (Melichar *et al.,* 2018); Manipur; Meghalaya (Mandal and Ghosh, 1999); Sikkim (Dudgeon, 1886); Uttarakhand (Smetacek, 1994, 2008; Sanyal *et al.,* 2018). *Elsewhere*: Nepal (Kishida, 1998); Thailand (Inoue *et al.,* 1997); Laos (Kishida and Yano, 2020); Vietnam (Kitching and Spitzer, 1995); Hong Kong (Kendrick and Young, 2014); Sri Lanka, Myanmar, Indonesia, peninsular Malaysia (Pittaway and Kitching, 2020).

Larval hostplants: *Aporosa* spp. (Phyllanthaceae) in India and Myanmar (Bell and Scott, 1937).

Remarks: The species is recorded here for the first time from Manipur.

Genus ***Cechetra*** Zolotuhin and Ryabov, 2012

31. *Cechetra lineosa* **(**Walker, 1856**)** - Striped Green Hawkmoth (Figure 3: M; Figure 5: C)

1856. *Chaerocampa (sic) lineosa* Walker, *List Specimens lepid. Insects Colln Br. Mus*., **8**: 144.

Material examined: INDIA, Manipur, Ukhrul District, Shirui Hills, Site 1 (25.1264ºN 94.4357ºE), 1930 m asl, 23.vii.2019 - 3♂, IJ1410, IJ1411, IJ1813; Site 2 (25.1235ºN 94.4407ºE), 2036 m asl, 24.vii.2019 - 2♂, 1♀, IJ1398, IJ1399, IJ1400, 13.ix.2019 - 2♀, IJ1405, IJ2335; Site 3 (25.1171ºN 94.4456ºE), 2190 m asl, 24.vii.2019 - 2♂, 1♀, IJ1153, IJ1155, IJ2322, 13.ix.2019 - 1♂, 1♀, IJ2323, IJ2324; Site 4 (25.1112ºN 94.4534ºE), 2425 m asl, 25.vii.2019 - 2♂, 2♀,IJ1586, IJ1590, IJ1591, IJ1595, coll. J.S. Irungbam.

Wingspan: ♂, 93 - 110 mm. Forewing length: 44 – 47 mm.

Distribution: India: Arunachal Pradesh, Ladakh, Sikkim (Sanyal *et al.,* 2018); Assam (Arandhara *et al*., 2017); Himachal Pradesh, West Bengal (Chandra *et al.,* 2014); Manipur; Meghalaya (Mandal and Ghosh, 1999); Uttarakhand (Smetacek, 1994, 2008). *Elsewhere*: Nepal (Kishida, 1998); Bhutan (Irungbam and Irungbam, 2019); Thailand (Inoue *et al.,* 1997); Taiwan (Fu *et al.,* 2013); Myanmar, southern China, Indonesia, Malaysia (Pittaway and Kitching, 2020); Vietnam (Kitching and Spitzer, 1995).

Larval hostplants: *Saurauia tristyla* (Actinidiaceae), *Impatiens* spp. (Balsaminaceae), *Vitis* spp. (Vitaceae) and *Polygonum* spp. (Polygonaceae) in India (Bell and Scott, 1937).

Remarks: The species is recorded here for the first time from Manipur.

32. *Cechetra minor* (Butler, 1875) - Lesser Green Hawkmoth (Figure 3: N; Figure 5: D)

1875. *Chaerocampa (sic) minor* Butler, *Proc. zool. Soc. Lond.,* 1875: 249.

Material examined: INDIA, Manipur, Ukhrul District, Shirui Hills, Site 1 (25.1264ºN 94.4357ºE), 1930 m asl, 23.vii.2019 - 2 ♂, 2 ♀, IJ1407, IJ1847, IJ1848, IJ1849; Site 2 (25.1235ºN 94.4407ºE), 2036 m asl, 24.vii.2019 - 1 ♂, IJ1401; Site 3 (25.1171ºN 94.4456ºE), 2190 m asl, 24.vii.2019 - 2 ♂, IJ1159, IJ1160; Site 4 (25.1112ºN

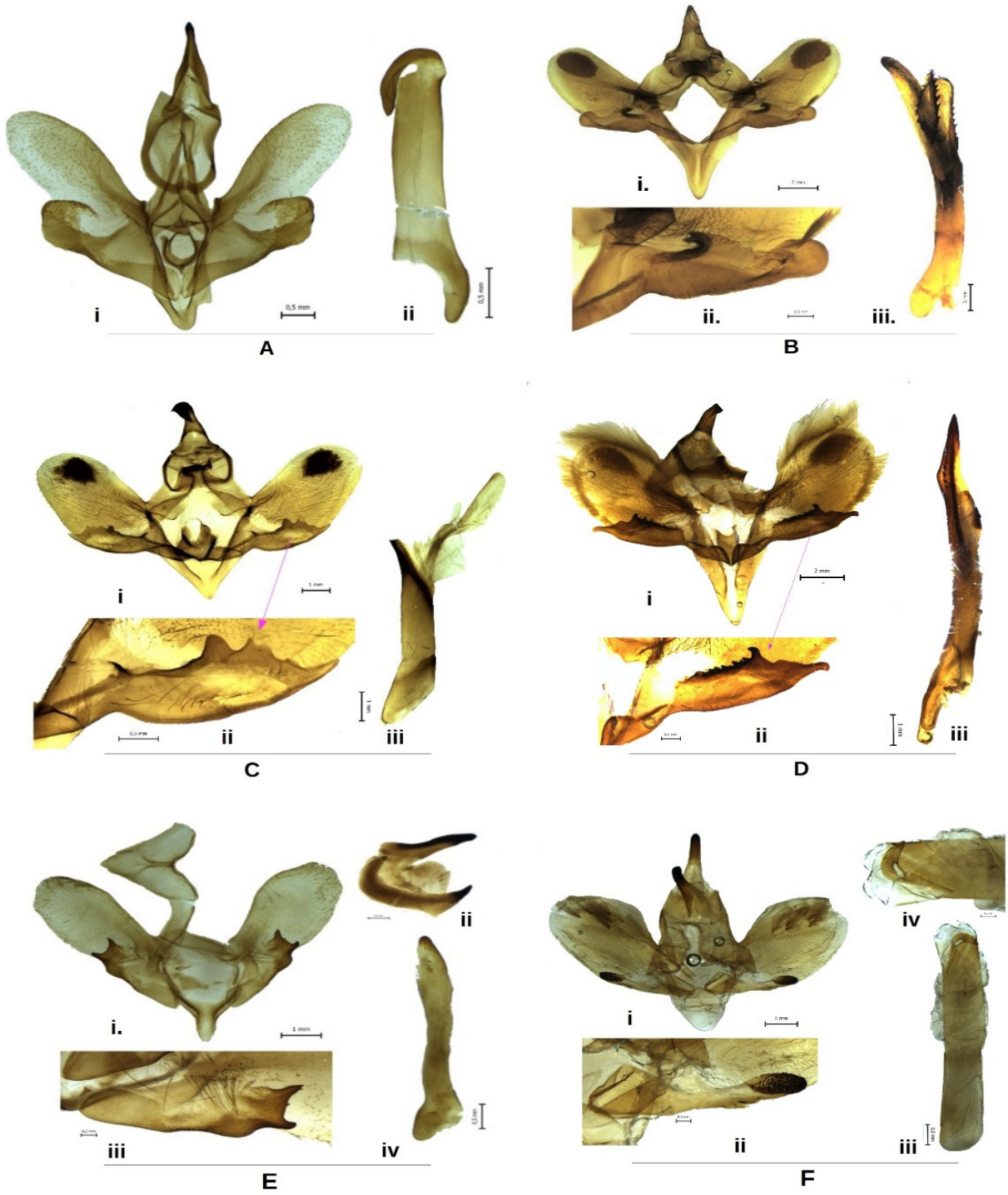

Figure 4. Male genitalia of adult Sphingidae. **A.** *Craspedortha porphyria porphyria* (Butler, 1876): (i) Genital capsule, (ii) Aedaegus. **B.** *Ambulyx liturata* Butler, 1875: (i) Genital capsule, (ii) Harpe, (iii) Aedaegus. **C.** *A. ochracea* Butler, 1885: (i) Genital capsule, (ii) Harpe, (iii) Aedaegus. **D.** *A. sericeipennis sericeipennis* Butler, 1875: (i) Genital capsule, (ii) Harpe, (iii) Aedaegus. **E.** *Sphinx oberthueri* (Rothschild and Jordan, 1903): (i) Genital capsule, (ii) Harpe, (iii) Gnathous, (iv) Aedaegus. **F.** *Acosmerycoides harterti* (Rothschild, 1895): (i) Genital capsule, (ii) Harpe, (iii) Aedaegus, (iv) Phallusarmature.

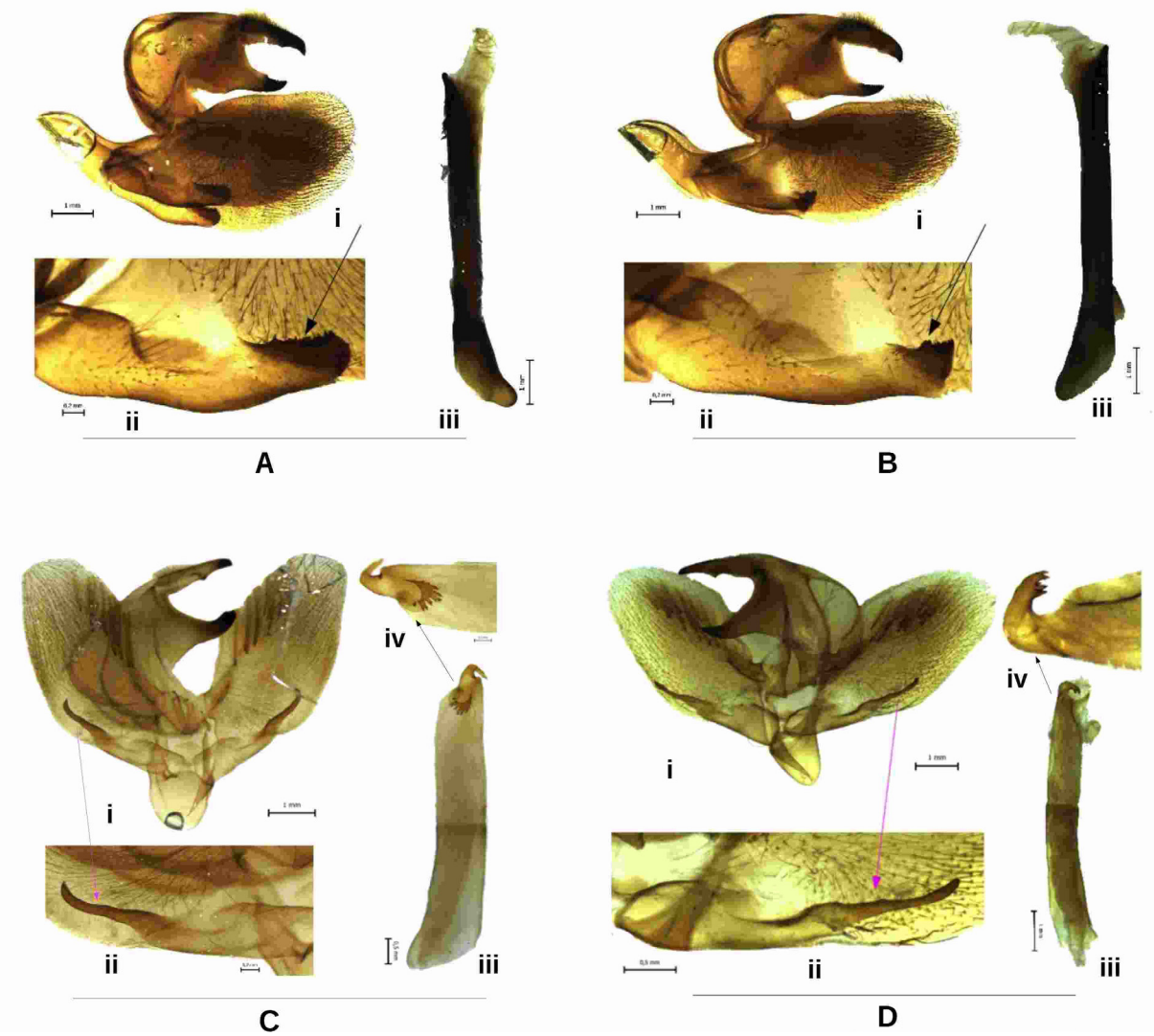

Figure 5. Male genitalia of adult Sphingidae. **A.** *Theretra clotho clotho* (Drury, 1773): (i) Genital capsule, (ii) Harpe, (iii) Aedaegus. **B.** *T. tibetiana* Vaglia and Haxaire, 2010: (i) Genital capsule, (ii) Harpe, (iii) Aedaegus. **C.** *Cechetra lineosa* (Walker, 1856): (i) Genital capsule, (ii) Harpe, (iii) Aedaegus, (iv) Phallus armature. **D.** *C. minor* (Butler, 1875): (i) Genital capsule, (ii) Harpe, (iii) Aedaegus, (iv) Phallus armature.

94.4534°E), 2425 m asl., 25.vii.2019 - 2 ♂, IJ1596, IJ1597, coll. J.S. Irungbam.

Wingspan: ♂, 76 – 80 mm. Forewing length: 36 – 38 mm.

Distribution: India: Arunachal Pradesh, Sikkim (Sanyal *et al.,* 2018); Himachal Pradesh, West Bengal (Chandra *et al.,* 2014); Manipur; Meghalaya (Mandal and Ghosh, 1999); Uttarakhand (Smetacek, 1994, 2008). *Elsewhere*: Nepal (Kishida, 1998); Bhutan (Irungbam and Irungbam, 2019); Thailand (Inoue *et al.,* 1997); Laos (Kishida and Yano, 2020); China, Japan, Vietnam (Kitching and Spitzer, 1995); Taiwan (Wu *et al.,* 2020).

Larval hostplants: *Saurauia pundiana* (Actinidiaceae), *Amorphophallus* spp. (Araceae) and *Vitis* spp. (Vitiaceae) in India (Bell and Scott, 1937).

Remarks: The species is recorded here for the first time from Manipur.

Genus ***Rhagastis*** Rothschild andJordan, 1903

33. *Rhagastis albomarginatus albomarginatus* (Rothschild, 1894) - Pale-Edged Mottled Hawkmoth (Figure 3: O)

1894. *Metopsilus albomarginatus* Rothschild, *Novitates Zoologicae,* **1**: 78.

Material examined: INDIA, Manipur, Ukhrul District, Shirui Hills, Site 1 (25.1264°N 94.4357°E), 1930 m asl, 23.vii.2019 - 1 ♂, IJ1419, coll. J.S. Irungbam.

Wingspan: ♂, 70 mm. Forewing length: 34 mm.

Distribution: India: Arunachal Pradesh (Athreya, 2013); Manipur; Meghalaya (Chandra *et al.,* 2014); Sikkim (Sanyal *et al.,* 2018). *Elsewhere*: Nepal (Kishida, 1998); Bhutan (Irungbam and Irungbam, 2019); Hong Kong (Kendrick, 2002; Kendrick and Young, 2014); Myanmar, China, Sumatra, Java, Borneo (Pittaway and Kitching, 2020).

Larval hostplants: *Hydrangea* spp. (Hydrangeaceae) in north-eastern India (Bell and Scott, 1937).

Remarks: The species is recorded here for the first time from Manipur.

34. *Rhagastis castor aurifera* (Butler, 1875) - Common Mottled Hawkmoth (Figure 3: P)

1875. *Pergesa aurifera* Butler, *Proc. zool. Soc. Lond.*: 7.

Material examined: INDIA, Manipur, Ukhrul District, Shirui Hills, Site 2 (25.1235°N 94.4407°E), 2036 m asl, 24.vii.2019 - 1 ♂, IJ1161; Site 3 (25.1171°N 94.4456°E), 2190 m asl, 24.vii.2019 - 1 ♂, IJ1417, 13.ix.2019 - 1 ♂, IJ2292, coll. J.S. Irungbam.

Wingspan: ♂, 70 mm. Forewing length: 32 mm.

Distribution: India: Arunachal Pradesh (Athreya, 2013); Assam (Arandhara *et al*., 2017); Manipur; Meghalaya (Mandal and Ghosh, 1999); Sikkim (Dudgeon, 1886); Uttarakhand (Smetacek, 1994, 2008; Sanyal *et al.,* 2018). *Elsewhere*: Nepal (Kishida, 1998); Bhutan (Irungbam and Irungbam, 2019); Thailand (Inoue *et al*., 1997); southern China, Vietnam (Kitching and Spitzer, 1995).

Larval hostplants: *Amorphophallus* spp. (Araceae) and *Vitis* spp. (Vitiaceae) in India (Bell and Scott, 1937).

Remarks: The species is recorded here for the first time from Manipur.

35. *Rhagastis confusa* Rothschild and Jordan, 1903 - Indistinct Mottled Hawkmoth (Figure 3: Q)

1903. *Rhagastis confusa* Rothschild andJordan, *Novit. zool*., **9** (suppl.): 793 (key), 795.

Material examined: INDIA, Manipur, Ukhrul District, Shirui Hills, Site 3 (25.1171°N 94.4456°E), 2190 m asl, 13.ix.2019 - 2 ♂, IJ2293, IJ2294, coll. J.S. Irungbam.

Wingspan: ♂, 76 mm. Forewing length: 37 mm.

Distribution: India: Arunachal Pradesh (Athreya, 2013); Assam, Himachal Pradesh, Sikkim (Chandra *et al*., 2014); Manipur; Meghalaya (Mandal and Ghosh, 1999); Uttarakhand (Smetacek, 1994, 2008); West Bengal (Shah *et al*., 2018). *Elsewhere*: Northern Pakistan (Rafi *et al.,* 2014); Nepal (Kishida, 1998); Bhutan (Irungbam and Irungbam, 2019); Thailand (Inoue *et al.,* 1997), southwestern China (Pittaway and Kitching, 2020); northern Vietnam (Kitching and Spitzer, 1995).

Larval hostplants: *Vitis* spp. (Vitiaceae) in India (Bell and Scott, 1937).

Remarks: The species is recorded here for the first time from Manipur.

36. *Rhagastis olivacea* (Moore, 1857) - Olive Mottled Hawkmoth (Figure 3: R)

1872. *Pergesa olivacea* Moore, *Proc. zool. Soc. Lond.*: 567.

Material examined: INDIA, Manipur, Ukhrul District, Shirui Hills, Site 1 (25.1264°N 94.4357°E), 1930 m asl, 23.vii.2019 - 2 ♂, IJ1418, IJ1850; Site 4 (25.1112°N 94.4534°E), 2425 m asl, 25.vii.2019 - 1 ♂, IJ332, coll. J.S. Irungbam.

Wingspan: ♂, 75 mm. Forewing length: 35 mm.

Distribution: India: Arunachal Pradesh (Athreya, 2013), Assam, Jammu and Kashmir, Himachal Pradesh (Pittaway and Kitching, 2020); Manipur; Sikkim (Sanyal *et al.,* 2018); Uttarakhand (Smetacek, 1994, 2008); West Bengal (Shah *et al.,* 2018). *Elsewhere*: Pakistan (Rafi *et al.,* 2014); Nepal (Kishida, 1998); Bhutan (Irungbam and Irungbam, 2019); Thailand (Inoue *et al.,* 1997); Laos (Kishida and Yano, 2020), northern Vietnam (Kitching and Spitzer, 1995), Myanmar, southern China (Pittaway and Kitching, 2020).

Larval hostplants: *Impatiens* spp. (Balsaminaceae) in India (Bell and Scott, 1937).

Remarks: The species is recorded here for the first time from Manipur.

Discussion

As such, there are no particular data available on the number of species of the family Sphingidae from Manipur. Chandra *et al.* (2014) reported the presence of 197 species

of Sphingidae in India. The present study recorded thirty-six species from Shirui hills, Manipur of which, twenty-nine species are new records to Manipur and two species (*S. oberthueri* and *T. tibetiana*) are a new addition to the Sphingidae fauna of India. *S. oberthueri* which was earlier reported from central and southwestern China to northern Thailand (Inoue *et al*., 1996) has now extended its distribution to the west in Manipur, India. *T. tibetiana* which was reported earlier from Tibeteast through Bhutan (Irungbam and Irungbam, 2019) and eastern China, Taiwan, South Korea and Japan, and south to northern Vietnam, northern Laos, andnorthern Thailand (Vaglia et al., 2010) have reported from Manipur in the present study. Three species viz. *A. convolvuli* (Linnaeus, 1758) and *D. elpenor* (Linnaeus, 1758) (Mandal and Ghosh, 2004) and *M. irata* Joicey and Kaye, 1917 (Vaidya et al., 2015) which was reported from Mao, Senapati district were also recorded from Shirui Hills, Ukhrul in the present study. Thus, the present records from the Shirui Hills show the lack of studies on the inventory of Sphingidae fauna in Manipur. Hence, more faunistic surveys are needed in the area so that a complete Sphingidae fauna from Manipur can be compiled.

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References

Athreya, R. 2013. Sphingidae of Arunachal Pradesh, North-east India: Inventory and Image Gallery. Available at: http://www.iiser-pune.ac.in/~rathreya/MothSph/MothSphingidae.html

Arandhara, S. 2016. A Preliminary Checklist on Hawkmoths of Digboi, Assam (Lepidoptera: Bombycoidea: Sphingidae). *Global Journal for Research Analysis*, **5**(10): 348-349.

Arandhara, S., Barman, S., Tanti, R. and Boruah, A. 2017. Macro moths of Tinsukia district, Assam: A provisional inventory. *Journal of Entomology and Zoology Studies*, **5**(6): 1612-1621.

Bortolin, A., Fabiano, F., Sforzi, A. and Bartolozzi, L. 1998. A contribution to the knowledge of the Sphingidae of North India (Insecta, Lepidoptera). Nachrichten des Entomologischen Vereins Apollo (N.F.), **19**(2): 141-148.

Bell, T.R.D. and Scott, F.B. 1937. *The Fauna of British India, including Ceylon and Burma*. Moths, Vol. 5, Sphingidae. Taylor and Francis, London. i-xviii, 1-537pp., 15pls.

Chandra, K. and Kumar, S. 1992. Moths (Heterocera: Lepidoptera) of Andaman and Nicobar Islands. *Journal of Andaman Science Association*, **8**(2): 138-145.

Chandra, K. 1994. Further new records of moths from Andaman and Nicobar Islands. *Journal of Andaman Science Association*, **10**(1 and 2): 17-24.

Chandra, K. and Nema, D.K. 2007. Insecta: Lepidoptera: Heterocera (Moths). In: *Fauna of Madhya Pradesh (including Chhattisgarh), State Fauna Series. Zoological Survey of India*, **15**(1): 347-418.

Chandra, K. and Sambath, S. 2013. Moths diversity of Tawang District, Arunachal Pradesh, India. *Journal of Threatened Taxa*, **5**(1): 3565-3570. http://dx.doi.org/10.11609/JoTT.o2718.966 https://doi.org/10.11609/JoTT.o2718.966

Chandra, K., Kumar, J., Sambath, S. and Mitra, B. 2014. A Catalogue of the Hawkmoths of India (Lepidoptera: Sphingidae). *Bionotes*, **16**(2): 37-47.

Cotes, E.C. and Swinhoe, C. 1887. A Catalogue of Moths of India. Pt. 1. - Sphinges. The Trustees of the Indian Museum, Calcutta, 40pp. https://doi.org/10.5962/bhl.title.29426

D'Abrera, B. 1986. Sphingidae Mundi: Hawk Moths of the World. E.W. Classey, Faringdon, Oxfordshire, 226pp.

Dudgeon, G.C. 1886. A catalogue of the Heterocera of Sikkim and Bhutan, Part 2. *The Journal of the Bombay Natural History Society*, **11**(2): 406-419.

Eitschberger, U. 2001. Neubeschreibungen von Arten in der Gattung *Psilogramma* Rothschild and Jordan, 1903 (Lepidoptera, Sphingidae). *Neue Entomologische Nachrichten, Marktleuthen*, Supplement, **1**: 1-63.

Eitschberger, U. 2010. Checkliste der Taxa des Genus *Psilogramma* Rothschild and Jordan, 1903. 6. BeitragzurKenntnis der Gattung (Lepidoptera, Sphingidae). *Neue Entomologische Nachrichten, Marktleuthen*, **64**: 122-133.

Eitschberger, U. 2012. Revision des *Marumba gaschkewitschii* (Bremer and Grey, 1852)-Artkomplexes (Lepidoptera, Sphingidae). *Neue Entomologische NachrichtenMarktleuthen*, **68**: 1-293.

Eitschberger, U. and Melichar, T. 2010. Die taxa der Gattung *Daphnis* Hübner, 1819, die Neugliederung der Unterarten von *Daphnis* hypothous (Cramer, 1780) mitneuerUnterartbeschreibung und der Neotypusdesignation von *Sphinx hypothous* Cramer, 1780 (Lepidoptera, Sphingidae). *The European Entomologist*, **2**(3-4): 49-91 (in German).

Fu, C.M., Ronkay, L. and Lin, H.H. 2013. Moths of Hehuanshan. Endemic Species Research Institute, Nantou. 557 pp. + 45 colour plates.

Ghorpade, K., Patil, R.R. and Chandaragi, M.K. 2013. Notes on Hawk Moths (Lepidoptera-Sphingidae) in the Karwar-Dharwar transect, peninsular India: a tribute to T.R.D. Bell (1863-1948). Colemania, Number 33, pp. 1-16.

Gurule, S.A. and Nikam, S.M. 2013. The moths (Lepidoptera: Heterocera) of northern Maharashtra: a preliminary checklist. *Journal of Threatened Taxa*, **5**(12): 4693-4713. https://doi.org/10.11609/JoTT.o2555.4693-713

Haruta, T. 1992. Sphingidae, 83-92pp. In: Haruta, T. (ed.). Moths of Nepal (Kishida, 1998), Part 1. Tinea Vol. 13 (Supplement 2). The Japanese Heterocerists' Society, Tokyo. i-xvii, 1-122pp., 1-32 plts.

Haruta, T. 1994. Sphingidae, 154-158 p. In: Haruta, T. (ed.). Moths of Nepal (Kishida, 1998), Part 3. Tinea Vol. 14 (Supplement 1). The Japanese Heterocerists' Society, Tokyo. i-xvii, 1-171 pp., 65-96 plts.

Haruta, T. 1995. Sphingidae. 89pp. In: Haruta, T. (ed.). Moths of Nepal (Kishida, 1998), Part 4. Tinea Vol. 14 (Supplement 2). The Japanese Heterocerists' Society, Tokyo, i-xviii, 1-206pp., 97-128 plts.

Haxaire, J., Gujjar, F. and Saeed, M. 2017. A preliminary list of the Sphingidae of Miandam, Khyber Pakhtunkhwa, north Pakistan (Lepidoptera Sphingidae). *The European Entomologist*, **9**(1): 25-41.

Hogenes, W. and Treadaway C.G. 1998. The Sphingidae (Lepidoptera) of the Philippines. Nachrichten des Entomologischen Vereins Apollo, Supplement, 17: 17-132.

Holloway, J.D. 1987. The Moths of Borneo (Part 3): Lasiocampidae, Eupterotidae, Bombycidae, Brahmaeidae, Saturniidae, Sphingidae. Southdene Sdn. Bhd., Kuala Lumpur, Malaysia, 20pls+199pp.

Inoue, H., Kennett, R.D. and Kitching, I.J. 1997. Moths of Thailand. Vol. 2 (Sphingidae). Brothers of St. Gabriel in Thailand, Bangkok, 149pp.

Irungbam, J.S. and Irungbam, M.J. 2019. Contributions to the knowledge of moths of Bombycoidea Latreille, 1802 (Lepidoptera: Heterocera) of Bhutan with new records. *Journal of Threatened Taxa*, **11**(8): 14022-14050; https://doi.org/10.11609/jott.4358.11.8.14022-14050 https://doi.org/10.11609/jott.4358.11.8.14022-14050

Ivshin, N., Krutov, V. and Romanov, D. 2018. Three new taxa of the genus *Cechetra* Zolotuhin and Ryabov, 2012 (Lepidoptera, Sphingidae) from south-east Asia with notes on other species of the genus. *Zootaxa*, **4450**(1): 1-25. https://doi.org/10.11646/zootaxa.4450.1.1 https://doi.org/10.11646/zootaxa.4450.1.1 PMid:30313854

Iyer, G. and Kitching, I.J. 2019. A preliminary study of the hawkmoth diversity (Lepidoptera: Sphingidae) of Kanyakumari District, Tamil Nadu, India. *Journal of Threatened Taxa*, **11**(5), 13592-13604. https://doi.org/10.11609/jott.4694.11.5.13592-13604

Kalawate, A. S. 2018. On a collection of Moths (Lepidoptera: Heterocera) from the northern Western Ghats of Maharashtra, India. *Zoology and Ecology*, **28**(3): 231-251. https://doi.org/10.1080/21658005.2018.1506378

Kaleka, A.P., Singh, D. and Kaur, P. 2018. Studies on Genus *Hippotion* Hübner(Sphingidae: Lepidoptera) from India. *Journal of Entomological Research*, **2**(1):129-134 https://doi.org/10.5958/0974-4576.2018.00022.1

Kathirvelu, C., Ayyasamy, R. and Karthikeyan, M. 2019. Preliminary checklist of moths (Lepidoptera: Glossata) of Annamalai Nagar, Tamil Nadu. *Journal of Applied and Natural Science*, **11**(2): 404 - 409. https://doi.org/10.31018/jans.v11i2.2063

Kendrick, R.C. 2002. Moths (Insecta: Lepidoptera) of Hong Kong. PhD Dissertation. The University of Hong Kong (Kendrick, 2002), xvi+660pp. Available at: http://hdl.handle.net/10722/31688

Kendrick, R.C. and Young, J.J. 2014. Pictorial Guidebook of Hong Kong Moths, Vol. 1. Hong Kong Lepidopterists' Society, Tuen Mun, Hong Kong, China, 64pp.

Khan, Z.H. and Raina, R.H. 2017. Diversity in family Sphingidae: Lepidoptera from Sikkim Himalaya. *Journal of Entomology and Zoology Studies*, **5**(6): 1903-1907.

Kitching, I.J. 2020. Sphingidae Taxonomic Inventory, Available at: http://sphingidae.myspecies.info/

Kitching, I.J. and Spitzer, K. 1995. An annotated checklist of the Sphingidae of Vietnam. *Tinea*, **14**: 171-195.

Kitching, I.J. and Cadiou, J.M. 2000. Hawkmoths of the World: An Annotated and Illustrated Revisionary Checklist. London and Ithaca (The Natural History Museum, Cornell University Press), viii + 226 pp. https://doi.org/10.1093/aesa/93.5.1195g

Kitching, I.J., Rougerie, R., Zwick, A., Hamilton, C. St Laurent, R., Naumann, S., Mejia, L.B. and Kawahara, A. 2018. A global checklist of the *Bombycoidea* (Insecta: Lepidoptera). *Biodiversity Data Journal*, **6**: e22236. https://doi.org/10.3897/BDJ.6.e22236 PMid:29674935 PMCid:PMC5904559

Kishida, Y. 1998. Sphingidae, 40-42pp. In: Haruta, T. (ed.). Moths of Nepal, Part 4. Tinea Vol. 15 (Supplement 1). The Japanese Heterocerists' Society, Tokyo. i-xviii, 1-206pp., 97-128 plts.

Kishida, Y. and Yano, T. 2020. Sphingidae, 103-109pp. In: Kishida, Y. (ed.). Moths of Laos, Part 1. Tinea Vol. 25 (Supplement 1). The Japanese Heterocerists' Society, Tokyo. 1-224pp., 1-94 plts.

Majumdar, M. and Kumar, J. 2010. Lepidoptera: Sphingidae. pp. 553-568. In: *Fauna of Uttarakhand, State Fauna Series. Zoological Survey of India*, **18**(2): 1-748.

Mandal, D.K. and Ghosh, S.K. 1999. Insecta: Lepidoptera: Sphingidae, Noctuidae and Geometridae. In, *State Fauna of Meghalaya, State Fauna Series. Zoological Survey of India*, **4**(6): 405-465.

Mandal, D.K. and Ghosh, S.K. 2004. Insecta: Lepidoptera: Moths. In, *Fauna of Manipur, State Fauna Series. Zoological Survey of India*, **10**: 531-540.

Mandal, D.K., Ghosh, S.K. and Majumdar, M. 2000. Insecta: Lepidoptera. In, *Fauna of Tripura, State Fauna Series*. Zoological Survey of India, **7**(3): 283-334.

Mandal, D.K. and Maulik, D.R. 1991. Insecta: Lepidoptera: Heterocera: Sphingidae and Geometridae. In: *Fauna of Odisha, State Fauna Series*. Zoological Survey of India, **1**(3): 227-233.

Mandal, D.K. and Maulik, D.R. 1997. Insecta: Lepidoptera: Heterocera: Sphingidae, Lasiocampidae, Lymantriidae and Ratardidae. In: *Fauna of West Bengal, State Fauna Series*. Zoological Survey of India, **3**(7): 613-687.

Mathew, G., and Rahamathulla, V.K. 1995. Biodiversity in the Western Ghats, A study with reference to moths (Lepidoptera: Heterocera) in the Silent Valley National Park, India. *Entomon*, 20(2): 25-33.

Mell, R. 1922. Beiträgezur Fauna sinica. Biologie und Systematik der südchinesischenSphingiden, vol. 1 and 2. R. Friedländerand Sohn, Berlin, xxii + 177 pp. + 331 pp. (in German)

Moulds, M.S., Tuttle, J.P. and Lane, D.A. 2020. Hawkmoths of Australia: identification, biology and distribution. Monographs of Australian Lepidoptera - Vol. 13, CSIRO Publishing, Canberra. 414 pp. https://doi.org/10.1071/9781486302826

Nakao, K. 2020. Digital Moths of Asia. Available at: http://www.jpmoth.org/~dmoth/Digital_Moths_of_Asia/Moths%20of%20Asia%20frame_new.html

Pathania, P.C., Sharma, S. and Gill, A.K. 2014. Hawk moths (Lepidoptera: Sphingidae) from north-west Himalaya along with collection housed in National PAU Insect Museum, Punjab Agricultural University, Ludhiana, India. *Biological Forum*, **6**(1): 120-127.

Paul, M., Das, S.K., Singh, R. and Pathania, P.C. 2017. Study and Updated checklist of moths (Lepidoptera: Heterocera) in selected areas of Delhi, India. *International Journal of Current Research*, **9**(08): 56208-56214.

Pittaway, A.R. and Kitching, I.J. 2020. Sphingidae of the Eastern Palaearctic (including Siberia, the Russian Far East, Mongolia, China, Taiwan, the Korean Peninsula and Japan). Available at: http://tpittaway.tripod.com/china/china.htm

Pittaway, A.R. 2020. Sphingidae of the Western Palearctic (including Europe, North Africa, the Middle East, western Siberia and western Central Asia). Available at: http://tpittaway.tripod.com/sphinx/list.htm

Pittaway, A.R. and Kitching, I.J. 2000. Notes on selected species of hawkmoths (Lepidoptera: Sphingidae) from China, Mongolia and the Korean Peninsula. *Tinea*, **16**(3): 170-211.

Rafi, M.A., Sultan, A., Kitching, I.J., Pittaway, A.R., Markhasiov, M., Khan, M.R. and Naz F. 2014. The hawkmoth fauna of Pakistan (Lepidoptera: Sphingidae). *Zootaxa*, **3794**(3): 393-418. https://doi.org/10.11646/zootaxa.3794.3.4 PMid:24870331

Robinson, G.S. 1976. The preparation of slides of *Lepidoptera genitalia* with special reference to microlepidoptera. *Entomologist's Gazette*, **27**: 127-132.

Rothschild, W. and Jordan, K. 1903. A revision of the lepidopterous family Sphingidae. *Novitates Zoologicae*, **9** (Suppl.): i-cxxxv, 1-972, 67 pls.

Sambath, S. 2011. Studies on the Sphingid fauna (Lepidoptera: Heterocera: Sphingidae) of Dalma Wildlife Sanctuary, Jharkhand. Records of the Zoological Survey of India. *Zoological Survey of India*, **111**(l): 25-30. Published by.

Sambath, S. 2014. Taxonomic Studies of Lepidoptera (Insecta) of Dalma Wildlife Sanctuary, Jharkhand (India). Records of the Zoological Survey of India, Occasional Paper No. *Zoological Survey of India*, **359**: 1-103+23 Plates. Published by.

Sanyal, A.K., Mallick, K., Khan, S., Bandyopadhyay, U., Mazumder, A., Bhattacharyya, K., Pathania, P.C., Raha, A. and Chandra, K. 2018. Insecta: Lepidoptera (Moths), 651-726pp. In: Chandra, K., Gupta, D., Gopi, K.C., Tripathy, B. and Kumar, V. (eds.). *Faunal Diversity of Indian Himalaya. Zoological Survey of India*, 1-872pp.

Scott, F.B. 1941. The hawkmoths of Darjeeling and Sikkim. *Journal of the Bengal Natural History Society*, **15**: 134-138.

Shah, S.K., Das, A., Dutta, R. and Mitra, B. 2018. A Current List of the Moths (Lepidoptera) of West Bengal. *Bionotes*, **20**(3): 88-91.

Sharma, G. 2014. Lepidoptera (Butterflies and Moths). pp. 41-104. In Eds., Studies on Odonata and Lepidoptera fauna of foothills of Aravalli Range, Rajasthan. *Records of the Zoological Survey of India, Occasional Paper*, **353**: 1-104.

Shubhalaxmi, V. and Chaturvedi, N. 1999. Abundance and distribution of moths of the families Saturniidae and Sphingidae in Sanjay Gandhi National Park. *Journal of the Bombay Natural History Society*, **96**(3): 379-386.

Shubhalaxmi, V., Kendrick, R.C., Vaidya, A., Kalagi, N. and Bhagwat, A. 2011. Inventory of moth fauna (Lepidoptera: Heterocera) of the Northern Western Ghats, Maharashtra, India. *Journal of the Bombay Natural History Society*, **108**(3): 183-205.

Singh, I.J. and Kitching, I.J. 2014. A first record of *Clanis hyperion* Cadiou and Kitching, 1990 (Lepidoptera: Sphingidae) in Bhutan, and a preliminary checklist of the hawkmoths of Mendrelgang, Bhutan. *Journal ofThreatened Taxa*, **6**(1): 5386-5388. https://doi.org/10.11609/JoTT.o3399.5386-8

Singh, N. Ahmad, J. and Joshi, R. 2017a. Diversity of moths (Lepidoptera) with new faunistic records from North East Jharkhand, India. *Records of the Zoological Survey of India*, **117**(4): 326-340. Published by Zoological Survey of India. https://doi.org/10.26515/rzsi/v117/i4/2017/121289

Singh, N, Ahmad, J. and Joshi, R. 2017b. An Inventory of Moths (Lepidoptera) from Topchanchi WLS, Jharkhand (India). *Journal of Entomology and Zoology Studies*, **5**(4): 1456-1466.

Smetacek, P. 1994. The hawkmoths (Lepidoptera: Sphingidae) of Kumaon, N. India: a probable case of faunal drift. Records of the Zoological Survey of India, Occasional Paper. Zoological Survey of India, **156**: 1-55.

Smetacek, P. 2008. Moths recorded from different elevations in Nainital District, Kumaon Himalaya, India. *Bionotes*, **10**(1): 5-15.

Smetacek, P. 2009. Additions and corrections to the list of moths recorded from different elevations in Nainital district, Kumaon Himalaya, India. *Bionotes*, **11**(4): 117-118.

Sondhi, Y. and Sondhi, S. 2016. A partial checklist of moths (Lepidoptera) of Dehradun, Mussoorie and Devalsari in Garhwal, Uttarakhand, India. *Journal of Threatened Taxa*, **8**(5): 8756-8776. https://doi.org/10.11609/jott.2814.8.5.8756-8776

Sondhi, Z., Sondhi, S., Pathour, S.R. and Kunte, K. 2018. Moth diversity (Lepidoptera: Heterocera) of Shendurney and Ponmudi in Agastyamalai Biosphere Reserve, Kerala, India, with notes on new records. *Tropical Lepidoptera Research*, **28**(2): 66-89.

Vaglia, T., Haxaire, J., Kitching, I.J. and Liyous, M. 2010. Contribution á la connaissance des *Theretra* Hübner, (1819), des complexes *clotho* (Drury, 1773), *boisduvali*i (Bugnion, 1839) et *rhesus* (Boisduval, 1875) d'Asiecontinentale et du Sud-est (Lepidoptera, Sphingidae). *The European Entomologist*, **3**(1): 1-37 (in French).

Vaidya, A, Huidrom, H. and Irungbam, J.S. 2015. An addition to the known range of *Marumba irata*Joicey and Kaye, 1917 (Lepidoptera: Sphingidae) in northeastern India. *Journal of Threatened Taxa*, 7(11): 7831-7832. https://doi.org/10.11609/JoTT.o4200.7831-2

Zolotuhin, V.V. and Ryabov, S.A. 2012. The hawkmoths of Vietnam. Korporatsiya Tekhnologiy Prodvizheniya, Ulyanovsk, 239 pp. (in Russian)